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ABBREVIATIONS

DOE	Department of Energy
EEI	Edison Electric Institute
ERA	Economic Regulatory Administration
FERC	Federal Energy Regulatory Commission
GAO	General Accounting Office
MW	megawatts
NARUC	National Association of Regulatory Utility Commissioners
NGA	National Governors' Association
NRC	Nuclear Regulatory Commission
REA	Rural Electrification Administration

Item 546-D GA 1.13: EMD-80-112

BY THE COMPTROLLER GENERAL

Report To The Congress

OF THE UNITED STATES

COMPLETED
ORIGINAL

Electricity Planning--Today's Improvements Can Alter Tomorrow's Investment Decisions

States have the primary responsibility for regulating utilities and overseeing their plans for balancing electricity supply and demand. However, GAO found that most State regulatory agencies are not well prepared to deal with the new power planning challenges, and some utility forcasting capabilities could be expanded. The Department of Energy recognizes it has the authority to assist in improving State and utility planning practices. However, officials have been hesitant to act because electricity planning is considered a State and utility function, and Federal legislation does not require the Department of Energy to provide assistance in these areas.

Timely Federal assistance is needed. Today's planning decisions--good or poor--will have an impact for decades on meeting the Nation's need for electric power at the lowest economic, environmental, and social costs to consumers, consistent with national energy objectives. The States' role in the review and approval of utility electricity plans should be supplemented and strengthened.

GAO recommends that the Department of Energy undertake a unified and coordinated planning role focusing on improving State and utility electricity planning practices.

EMD-80-112
SEPTEMBER 30, 1980

188

COMPTROLLER GENERAL OF THE UNITED STATES
WASHINGTON D.C. 20548

B-199874

To the President of the Senate and the
Speaker of the House of Representatives

This report discusses the States' and utilities' responsibilities in determining the need for future electrical generating capacity, analyzes their electric planning capabilities and practices, describes Federal agencies' electrical planning roles, and cites how Federal/State/utility planning responsibilities can be improved.

This review was conducted due to the importance and long-lasting effects of electricity planning. The technical, economic, environmental, and social conditions under which utilities produce electricity place an exceptionally high value on careful planning. Utilities and their customers risk significant economic loss if new powerplants provide substantially more or substantially less power than is needed by consumers, or if less costly alternatives prove feasible.

Copies are being sent to the Director, Office of Management and Budget; the Secretaries of Energy, and Agriculture; the Chairman, Federal Energy Regulatory Commission; the Chairman, Nuclear Regulatory Commission; and the House and Senate committees and subcommittees having oversight responsibilities for the matters discussed in the report.

Comptroller General
of the United States

A

COMPTROLLER GENERAL'S
REPORT TO THE CONGRESS

ELECTRICITY PLANNING--TODAY'S IMPROVEMENTS CAN ALTER TOMORROW'S INVESTMENT DECISIONS

D I G E S T

Forecasts project that the national demand for electricity could require electrical generating capacity to more than double by the end of this century. (See p. 1.)

Although States have the primary responsibility for regulating electric utilities and overseeing their plans for balancing power supply and demand, GAO found through use of a questionnaire that most States are not well prepared to deal with power planning under changing conditions and few have developed sufficient analytical capabilities to evaluate these projections. GAO learned that some utility forecasting capabilities could be expanded to use better available methods which deal more explicitly with uncertainty and other key factors, such as price and conservation. (See p. 19.)

Electric utilities are planning to meet future growth primarily by constructing nuclear and coal-fired plants. Implementing these plans will tie up enormous amounts of capital--perhaps as much as $333 billion through 1989. (See p. 15.) Investments in generating facilities can be slowed and power costs reduced by improving the quality of electric power planning and implementing alternatives stressed in the National Energy Plan such as conservation and renewable energy sources.

States which have taken a closer look at utility forecasts have identified deficiencies and have developed significantly different estimates of future power needs from their utilities. (See p. 21.) Most of the States, however, continue to rely heavily on utility forecasts and to approve utility investment decisions with minimal scrutiny of forecasting practices and assumptions.

Most States lack assurance that the full range of power supply/demand options--particularly alternatives such as conservation,

load management, cogeneration, and renewable energy sources--are thoroughly studied and implemented when more cost-effective than conventional nuclear or coal-fired plants. Actions by most States do not assure consumers that their future power needs will be met at the lowest economic, environmental, and social costs. (See p. 25.) Utilities presently have little positive economic or regulatory incentive to promote energy conservation, solar, and other renewable energy options. While many of the States were dissatisfied with utility progress in implementing these options, few States had developed new incentives to encourage greater utility involvement. (See p. 33.)

FEDERAL EFFORTS NOT DIRECTED TO IMPROVING ELECTRICITY PLANNING

The Department of Energy (DOE) recognizes it has the authority to assist States and utilities in improving the quality of State, regional, and utility power plans. No Federal energy agency has assumed such a responsibility. DOE officials recognize that serious problems exist in demand forecasting, assessment of feasible alternatives, and public involvement, but they have not taken an aggressive approach to solve these problems. DOE officials advised us that they have been hesitant to act because (1) electricity planning is considered a State and utility function and (2) Federal legislation does not require DOE to assist States and utilities in these areas. (See p. 38.)

Federal responsibilities relating to electric power are fragmented and involve several energy agencies. Few of the programs implemented by these agencies are specifically designed to improve electricity planning, although many of them can impact on the planning function. Federal electricity programs are not coordinated through a set of common objectives, policies, or evaluation systems. Under these conditions, there is inadequate assurance that Federal efforts are responsive to the planning needs of electric utilities, State utility regulators, and power consumers.

Electric utilities, States, regions, and Federal Government agencies should work together to improve electric power planning and decisionmaking.

The Federal Government should work to supplement and strengthen, not subordinate, the State's role in the review and approval of utilities' electricity plans.

RECOMMENDATIONS TO THE SECRETARY OF ENERGY

The Secretary of Energy has the authority to undertake a unified and coordinated planning role focusing on improving State and utility planning practices and should be taking actions to assure that the Nation's need for electric power is met at the lowest economic, environmental, and social cost, and in a manner consistent with national energy policies.

Therefore GAO recommends the Secretary of Energy:

--Establish in the Economic Regulatory Administration (ERA) a responsibility center to coordinate all DOE efforts relating to improving electric power planning. (See p. 47.)

--Direct the Administrator of ERA to develop, with input from other DOE offices and Federal agencies, a unified electricity program that addresses needed improvements in forecasting future electricity needs, assessing power supply/demand alternatives, and providing timely public participation in electricity planning. The program should not be designed to usurp State and utility planning responsibilities. Before the program is finalized, States, utilities, and other interested parties should be afforded the opportunity to comment. DOE should consider using its regional offices to carry out this program. (See p. 47.)

--Undertake projects, whenever possible with the States and utilities, to identify at State, Federal and regional levels, the energy, regulatory, and economic policies which are currently shaping utility policies and suggest what policy changes are needed to carry out national energy objectives. In addition, projects should identify and

provide mechanisms for permitting public participation early in the utility planning process. (See p. 48.)

--Direct the Administrator of ERA to prepare a plan for regulatory interventions to be used whenever DOE's oversight of electricity planning at State and regional levels indicates that the interests of power consumers or the objectives of national energy policy are not adequately protected by the planning and evaluation techniques in use. (See p. 48.)

ERA's program should include development of a manual to communicate the information needed to help carry out the developed program plan and periodic dissemination of information. (See p. 48.)

DOE indicated it would need additional staff to implement GAO's recommendations and authority to obtain needed data. DOE should reallocate staff, where possible, to carry out the recommendations. If reallocation is not feasible and if DOE still believes it lacks sufficient (1) staff and (2) authority to obtain necessary data from States and/or utilities in a timely manner, GAO recommends that DOE seek such resources and authority from the Congress. (See p. 49.)

RECOMMENDATION TO THE NUCLEAR REGULATORY COMMISSION

GAO recommends that the Nuclear Regulatory Commission (NRC), before issuing both a construction permit and an operating license for a nuclear generating facility, review and use as a guide the information developed by ERA's electricity program. NRC should periodically explain to ERA in writing its use of the information and ways, if any, in which the data could be made more useful to NRC. (See p. 49.)

RECOMMENDATION TO THE SECRETARY OF AGRICULTURE

GAO recommends the Secretary of Agriculture require the Administrator of the Rural Electrification Administration (REA), before making financing decisions on electrical generating facilities, to review and use

as a guide the information developed by ERA's electricity program. REA should periodically explain to ERA in writing its use of the information and ways, if any, in which the data could be made more useful to REA. (See p. 50.)

AGENCY COMMENTS

A draft of this report was provided to the Nuclear Regulatory Commission, the National Governors' Association, the Department of Agriculture, the Department of Energy, the Edison Electric Institute, the Federal Energy Regulatory Commission, and the National Association of Regulatory Utility Commissioners for their review and comment. Written comments were received from six organizations and are included in appendixes II through VII. Oral comments were provided by the National Association of Regulatory Utility Commissioners. The report was revised in several sections to reflect technical comments. The agency comments along with GAO's response to them are discussed in chapter 6. In general, points made by the agencies include:

--The Nuclear Regulatory Commission endorsed our recommendations.

--The Department of Energy said it had authority to carry out the recommendations, but believed such an effort would require a significant increase in staff and accessability to data.

--The National Governors' Association agreed with our finding that few States have developed sufficient analytical capabilities to validate utility projections of need, but thought Federal financial assistance was needed.

--Both Department of Agriculture and the Edison Electric Institute raised a general concern that Federal involvement in the decision-making process would be controversial and such a role would place a burden on utilities.

--The Federal Energy Regulatory Commission agreed with our recommendation that to the degree the Department of Energy's comprehensive planning program could encourage more effective regional power planning, it could be helpful, but added that a Federal role should not have the responsibility for approving new construction.

--The National Association of Regulatory Utility Commissioners supports improved Federal/State cooperation and interprets the report as not calling for further Federal intrusion in the State regulatory process.

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NGA	National Governors' Association
NRC	Nuclear Regulatory Commission
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GLOSSARY

Alternative electricity	Generating and generation-displacing options to coal-fired and nuclear electricity generating facilities. Options include conservation, load management, cogeneration, solar hot water and space heating, wind energy systems, and small hydropower.
Baseload	The minimum load in a power system over a given period of time.
Capacity	Maximum power output, expressed in kilowatts or megawatts. Equivalent terms: peak capability, peak generation, firm peakload, and carrying capability.
Cogeneration	The simultaneous production of electricity and useful heat.
Conservation	Improving the efficiency of energy use; using less energy to produce the same product.
Cooperative	A private nonprofit corporation, operating within State laws, but essentially self-regulating.
Demand	In an economic context, the quantity of a product that will be purchased at a given price at a particular point in time. In a utility context, the rate at which electric energy is delivered to or by a system, expressed in kilowatts, megawatts, or kilovolt amperes over any designated period.

Demand forecast	Projection of the future demand for electricity. Various types of demand forecasting models include trending, econometric, and engineering or end-use.
Econometric model	A forecasting model based on assumed relationships between electricity consumption and general demographic and economic variables such as gross national or State product, prices of electricity and competing fuels, prior year's electricity sales, and population.
Electricity planning	Procedures used to develop electricity plans. Procedures address forecasting, analyzing options, and public participation.
Electricity plans	Determination of supply sources (e.g., nuclear, coal, alternatives) which will satisfy projected electricity demand.
End-use (engineering) model	A forecasting model relying on a detailed enumeration of all energy-using equipment that is expected to be functioning during the forecast period. A use-rate is applied to each type of equipment to forecast total energy consumption.
Energy	The ability to do work; the average power production over a stated interval of time; expressed in kilowatt-hours, megawatt-hours, average kilowatts, or average megawatts. Equivalent terms: energy capability, average generation, and firm energy load carrying capability.

Hydropower	A term used to identify a type of generating station, or power, or energy output in which the prime mover is driven by water power.
Investor-owned utility	A utility which is organized under State laws as a corporation for the purpose of earning a profit for its stockholders.
Kilowatt	The electrical unit of power which equals 1,000 watts.
Load	The amount of electric power delivered to a given point on a system.
Load management	Influencing the level and state of the demand for electrical energy so that demand conforms to individual present supply situations and long-run objectives and constraints.
Megawatt (MW)	The electrical unit of power which equals 1,000,000 watts or 1,000 kilowatts.
Municipal utility	A utility owned and operated by a city.
Off-peak	A period of relatively low system demand for electrical energy as specified by the supplier, such as in the middle of the night.
Peaking	Operation of generating facilities to meet maximum instantaneous electrical demands.
Peaking capacity	Generating equipment normally operated only during the hours of highest daily, weekly, or seasonal loads. Some generating equipment

	may be operated at certain times as peaking capacity and at other times to serve loads on a round-the-clock basis.
Peakload	The maximum electrical load consumed or produced in a stated period of time. It may be the maximum instantaneous load (or the maximum average load) within a designated interval of the stated period of time.
Power	The time rate of transferring or transforming energy; for electricity, expressed in watts. Power, in contrast to energy, always designates a definite quantity at a given time.
Reliability	Generally the ability of an item to perform a required function under stated conditions for a stated period of time. In a power system, the ability of the system to continue operation while some lines or generators are out of service.
Reserve capacity	Extra generating capacity available tc meet unanticipated demands for power or to generate power in the event of loss of generation resulting from scheduled or unscheduled outages of regularly used generating capacity. Reserve capacity provided to meet the latter is also known as forced outage reserve.
Time-of-day pricing	Rates imposing higher charges during those periods of the day when the higher costs to the utility are incurred.
Trend forecast	A forecast that relies heavily on historical consumption patterns to project future consumption.

CHAPTER 1

INTRODUCTION

Electricity is an important source of energy for the United States economy. From heating and lighting buildings to powering mass transit systems, electricity meets 30 percent of the Nation's energy requirements. Forecasts indicate that electricity could account for 37 percent of the U.S. primary energy consumption in 1985, more than 50 percent in the year 2000, and that the national demand for electricity could require electrical generating capacity to more than double by the end of the century. 1/ However, other forecasts have projected that demand will grow at a lesser rate.

Electric utilities are planning to meet this projected growth primarily by constructing nuclear and coal-fired generating facilities. Implementing these plans will tie up enormous amounts of capital. For example, based on a 1980 report, 2/ the utilities are projecting that peak electricity demand will grow at about a 4.3-percent annual rate through 1989. This would necessitate building about 233,500 megawatts (MW) 3/ of additional generating capacity at a cost approaching $333 billion. However, other analysts of the utility industry believe that investments in such generating facilities can be slowed and power costs reduced by better forecasting data and methods and by implementing alternative measures stressed in the National Energy Plan, such as energy conservation and increased use of alternative energy sources.

1/"Forecast of Likely U.S. Energy Supply/Demand Balances for 1985 and 2000 and Implications for U.S. Energy Policy," U.S. Department of Commerce, Jan. 20, 1977.

"Summary of Projected Peak Load, Generating Capability, and Fossil Fuel Requirements for the Regional Reliability Councils of NERC," July 1979, by the National Electric Reliability Council, Princeton, N.J.

2/"Electric Power Supply and Demand for the Contiguous United States 1980-1989" as projected by the Regional Reliability Councils in their Apr. 1, 1980, Coordinated Bulk Power Supply Programs to the Department of Energy, U.S. Department of Energy, July 1980.

3/This would equate to 233 generating plants assuming 1,000 MW capacity.

THE IMPORTANCE OF ELECTRICITY PLANNING

The technical, economic, environmental, and social conditions under which utilities produce electricity place an exceptionally high value on careful planning. Good planning is needed because of the uncertainty of future demand levels, long leadtimes for constructing coal and nuclear plants, high construction costs, delays in constructing new powerplants, and the feasibility of alternative energy technologies. Power planning decisions are long lasting. Electric utilities must plan today to satisfy demand 10 to 20 years in the future. Utilities and their customers risk significant economic loss if new powerplants provide substantially more or substantially less power than is needed by consumers, or if less costly alternatives prove feasible.

Flexible and farsighted plans could minimize the serious and long-lasting impacts resulting from electrical generation by restraining power production costs, while assuring adequate power supplies. However, reliable power plans are constrained by events which are unforeseen and unrelated (e.g., supply interruptions, natural disasters). Power planning involves (1) the development and use of reliable demand forecasts that contain explicit and appropriate assumptions incorporating the best available data, (2) thorough analysis of all generating, and generation-displacing options to balance electricity supply and demand, and (3) early-on public participation in the planning process.

Electric power plans developed by utilities and reviewed by State regulators are immensely important--to the State or region served by the utilities, to the consumers, and to the successful implementation of national energy policies. Collectively, the plans of the 3,500 domestic utilities, when approved and acted upon, represent the national blueprint for electric power.

There is increasing concern about the economic, environmental, and social impacts of new generating facilities. Implementing current electric utility plans will predominantly involve constructing nuclear and coal-fired generating facilities which take 8 to 14 years to complete. Planners will be committing their customers to investments long before power is produced. Because new powerplant costs greatly exceed the cost of older installed capacity, rate increases, sometimes of great magnitude, are a typical result. Investments in coal-fired and nuclear plants will tie up for long time frames significant amounts of capital which will be unavailable for investment in energy conservation programs, or other alternatives which prove to be commercially feasible.

Social and environmental concerns address the issues of public health and safety, nuclear waste disposal, spent fuel storage and plant decommissioning, elaborate and expensive air pollution equipment for coal plants, carbon dioxide emissions affecting the world's climate, mining safety, uncertainty of long-term availability and price of fuel supplies, the quality and availability of water, and the "boom-town" phenomenon which often accompanies major energy development in rural areas. In addition, decisions can impact on more than just local areas or even States and have grown to where impacts are of a regional perspective.

UTILITY AND STATE PLANNING ROLES

About 3,500 domestic utilities--which vary greatly in size and ownership--generate, transmit, or distribute electricity. Utility owners include private investors, State and local public agencies, rural cooperatives, and Federal agencies. Utilities are chartered by States to provide an adequate and reliable supply of electricity--to maintain reserves in order to deliver power whenever and wherever needed without sudden or widespread outages. Utilities function as regulated monopolies for retail trade. Utilities have traditionally provided the leadership for electricity planning. They forecast future demands for electricity and prepare supply plans to meet those demands. Utilities must balance whether to risk the extra costs of overplanning with the probable costs of shortfalls that may go with underplanning.

States are responsible for regulating utilities by determining the need for additional generating facilities, approving sites for generating facilities, ensuring reliability and adequacy of service, and approving power rates and rates of return on invested capital. In addition, States, in general, perceive it as their responsibility 1/ to perform certain electricity duties, including ensuring (1) realistic electricity demand forecasts, (2) development of renewable energy resource potential, (3) power supplies for all customers, (4) evaluation of the costs and benefits of alternative methods of meeting future power needs, (5) the implementation of cost-effective conservation programs, and (6) public participation in electric utility planning and policymaking.

1/Most States perceived they had these responsibilities for investor-owned utilities, but a number did not believe they had such responsibilities for publicly owned utilities. (See appendix I.)

FEDERAL ELECTRICITY DIRECTION

Legislation, administration energy policy, and the national energy principles serve as the backbone for several Federal agencies to be involved with electric power planning. Many Federal energy laws for regulation, conservation, and energy resource management were centralized into one agency--the Department of Energy (DOE)--with its creation in October 1977. Additional responsibilities were assigned to DOE with passage of the National Energy Act 1/ in late 1978. DOE's Economic Regulatory Administration (ERA) is responsible for (1) assuring the reliability and adequacy of bulk power supply; (2) prohibiting the burning of oil or natural gas in new powerplants and encouraging and fostering the greater use of coal and other alternatives (e.g., biomass, renewable and geothermal energy sources) as a primary energy source; (3) monitoring State regulatory bodies' reviews of various rate structures and standards; and (4) intervening in Federal and State regulatory proceedings to promote national energy policies and principles. DOE's Federal Energy Regulatory Commission (FERC) licenses non-Federal hydroelectric projects and has jurisdiction over the rates for electricity sold at wholesale in interstate commerce. DOE is also responsible for approving State and utility plans informing residential customers of suggested energy conservation and solar energy measures and estimating the energy savings and costs of such measures. DOE's power marketing agencies, such as the Bonneville Power Administration, are responsible for marketing electricity produced at Federal hydroelectric projects.

Other Federal agencies 2/ are also involved with electricity. The Nuclear Regulatory Commission (NRC) licenses nuclear powerplants. Before issuing a construction permit for the plant, NRC is required to assure there is a valid need for the power, and that the proposed nuclear plant is the best alternative for meeting that need for power. The Rural Electrification Administration (REA) in the Department of Agriculture approves requests from rural electric

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1/Public Laws 95-617 through 95-621--Public Utility Regulatory Policies Act, Energy Tax Act of 1978, National Energy Conservation Policy Act, Powerplant and Industrial Fuel Use Act, Natural Gas Policy Act of 1978--were enacted Nov. 9, 1978, and are collectively referred to as the National Energy Act.

2/For the purpose of this report, the Tennessee Valley Authority is not singled out as a Federal entity involved in planning but is treated as a utility that would benefit from Federal guidance in the planning area.

systems for loans and loan guarantees to finance the construction and operation of electric generating, transmission, and distribution facilities.

The April 1977 National Energy Plan proposed by the Administration emphasized reducing the Nation's dependence on oil and gas imports, increasing energy conservation, and accelerating development of renewable energy sources. The President in his energy message of June 20, 1979, established a national goal of deriving 20 percent of the Nation's energy needs from the sun by the year 2000.

Although Federal activity is increasing, the primary authority for regulating electric utilities remains with States. Federal legislation and policy discussed earlier do not alter the basic charters of State regulatory agencies but assigns important new responsibilities to both Federal and State agencies for helping to shape the Nation's energy and electricity future.

OBJECTIVE, SCOPE, AND METHODOLOGY

Our review was performed to determine (1) how States view their electricity planning responsibilities; (2) how electric utilities are planning to meet future electricity demands; (3) what analytical and review techniques are used by State regulatory agencies to evaluate utility plans; (4) how Federal agencies assist States in carrying out their electricity planning responsibilities; and (5) if electric power planning is consistent with Federal legislation, the national energy plan principles, and recent administration energy policy initiatives.

We employed a consultant to assist us in developing and designing an electricity planning questionnaire for all 50 States and the District of Columbia and analyzing the results. The questionnaire was employed to achieve the broadest response within a limited time frame. The questionnaire was sent to the appropriate energy office, public utility commission, or other representative. Survey results were obtained by the consultant through a mail response and followup, or a direct telephone inquiry. The consultant received partial or complete responses from 43 States during the period March through August 1979. (See appendix I.)

We did not contact individual utilities to determine their role and methods used in power planning. Information on utilities was obtained through the questionnaire and contact with, and review of reports of, the National Association of Regulatory Utility Commissioners, the

National Electric Reliability Council, the Edison Electric Institute, and the Electric Power Research Institute. In order for us to directly assess the status of electric power planning in a number of States with various capabilities, our audit teams visited six States--California, Louisiana, New York, North Carolina, Washington, and Wisconsin. Our work effort also entailed a review of pertinent Federal legislation and policies associated with electricity planning, discussions with Federal officials responsible for electricity regulations and those responsible for programs whose results should be considered in power planning, contact with the National Governors' Association, and several public interest research groups.

OTHER GAO ELECTRICITY PROJECTS

In addition to this report on electricity planning, we are conducting two other studies addressing electricity. One assignment focuses on the costs of Federal regulation on the electric utility industry and the other addresses the impacts of delays and cancellations of electricity generating plants.

CHAPTER 2

NEW UNCERTAINTIES IN POWER PLANNING

The electric power industry has entered a period of significant, and somewhat traumatic, change. Until the late 1960s, most utility operations were characterized by steady demand growth, increasing production efficiencies, and minimal public attention or regulatory scrutiny. Industry plans were largely extensions of past results, as might be expected in a stable and monopolistic business environment. In the 1970s this stability was shattered by a combination of factors including rapidly escalating costs of new generating facilities, greatly increased public concern about the environmental and social impacts of large powerplants, recognition of America's dependence on imported fuels as a serious national problem, and subsequent steps taken to deal with this problem.

Power planners long accustomed to stability are now faced with challenges resulting from important changes in their planning environment. Three new challenges are of special importance to planners and policy analysts:

--The preparation of demand forecasts and their incorporation in utility decisionmaking is becoming more complex.

--Alternatives to coal and nuclear powerplants are becoming available.

--The public is increasing its role in power system development.

The manner in which electric utilities and State regulatory agencies respond to these challenges is a subject of vital concern. The plans proposed, approved, and acted on by these institutions will determine for three to five decades the economic, environmental, and social costs consumers must pay for electric power. Those consumers served by utilities and regulators successfully planning for the challenges of changed conditions will continue to receive adequate electric service at the lowest available cost--even though this cost will be higher. Other consumers--those served by institutions not adequately planning for change--may face declining service and higher costs than necessary because new problems have been approached with inflexible and more expensive solutions.

ENVIRONMENT THROUGH THE 1960s

Since its inception, the utility industry was continually planning to meet accelerating load growth conditions and system reliability. Electricity growth to a large extent corresponded to the Nation's economic growth. With few exceptions, the demand for electrical power has increased every year and doubled about every 10 years. Technological progress, which characterized this period by focusing on economies of scale through building larger generating units, resulted in reduced consumer prices (see fig. 1) and greater efficiency of fuels used for generation (see fig. 2). This period was also distinguished by sales (see fig. 3) and revenues growing at steady rates, cost of facilities and construction time frames changing little, fuel being in plentiful supply, and environmental or social impacts concerning few people. Consequently, despite its size and importance to all sectors of the economy, the electric power industry received little public attention. This largely reflected its ability to lower rates while the prices of other services were rising.

Regulatory actions--relating to the propriety of power rates, environmental impacts, and other factors--played a modest role in the growth of the industry. For many years, industry's productivity growth more than offset increased expansion costs, and industry's ability to lower rates led to few confrontations with regulators or consumers. The regulatory process faced by electric utilities was relatively simple, and the outcome of rate proceedings and reviews of major expansion plans was predictable. Controversies over electric power plans and policies were rare. Unfortunately for power planners and consumers alike, these conditions changed.

THE 1970s BRING CHANGE TO THE INDUSTRY

Surging inflation, construction cost pressures, and increases in total operating expenditures, which were compounded by the dramatic rise in fuel prices (see figs. 2 and 4), exceeded utilities' improvements in productivity. Consumer rates significantly increased (see fig. 1), spawning a host of consumer protests and intervention in regulatory hearings.

The large size, costs, and environmental and safety impacts of new generating facilities have focused additional attention on the electric power industry's plans for meeting future electricity needs. The potential impact of a 1,100-MW nuclear powerplant scheduled for completion in 1985 is substantially greater than the impact of a 200-MW hydroelectric plant built in the 1950s. Most new powerplants are so large and so costly that their siting and funding

are regional issues which affect ratepayers and regulators in several States. Concerns have substantially increased as a result of the recent accident at the Three Mile Island nuclear plant in Pennsylvania. New regulatory requirements reflecting such concerns will further intensify current cost pressures. Because of these factors the industry has come, within a few years, from a position of generally amicable public relations to one in which many utility officials perceive public attitudes as one of their major problems.

NEW CHALLENGES FOR UTILITIES AND THEIR REGULATORS

A variety of factors have combined to greatly increase the uncertainty in electric power planning. Rising prices and conservation activities are making future power demands more difficult to estimate; rate reforms are making sales and revenue projections less certain; power production costs are being raised by rapid inflation; proliferating environmental and regulatory requirements are lengthening construction schedules; and regulatory reviews are becoming more complex and less predictable in their outcomes. In turn, industry, faced with declining growth rates, has canceled some large projects and is experiencing delays with others. Thus, utilities are continually confronted with altering construction schedules to meet demand and planning for the uncertainties in the scheduled availability of new generating facilities.

Reliably forecasting future power needs--always an art rather than a science--has become much more difficult. The industry's record of sales matching projected demand growth was interrupted in 1974 by a recession, power price increases, and conservation efforts in the wake of the 1973 oil embargo. Total sales of electricity declined in 1974 (see fig. 3). Since then the growth rates have continued to be significantly below those experienced in the 1960s. The uncertainty of future demand growth has slowed the acquisition of expensive new generating facilities.

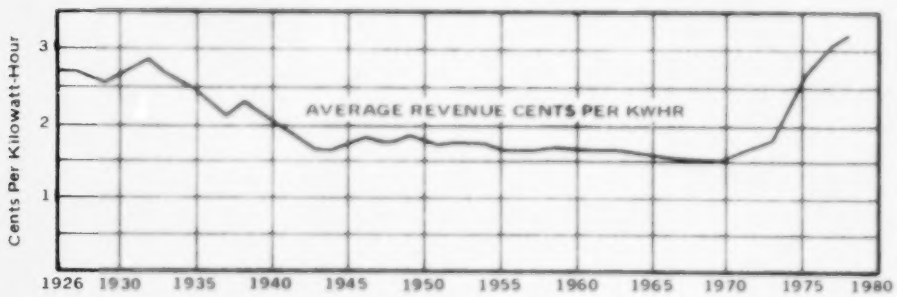
As a result of the dramatic escalation in power operating costs (see fig. 4), consumer and public interest groups and some regulators are insisting that electric utilities explore all feasible alternatives to meeting future power needs. Many of the alternatives recommended for study are unconventional in the domestic utility industry. They include generating and generation-displacing options which can help utilities balance electric power supply and demand, in some cases, with minimal investments and rate increases. Innovative generating or generation-displacing options include cogeneration of electricity and heat needed for industrial

processes, geothermal generation, and a variety of solar-based alternatives, such as windpower, biomass conversion, small hydroelectric projects, and direct solar heating, cooling, or production of electricity. Other options include conservation actions, such as insulation and weatherization of buildings, improved interties between neighboring utility systems, power pricing initiatives which stimulate increased energy awareness and efficiency, and load management techniques which enable utilities to smooth out the peaks and valleys in their loads.

Public participation can also affect a utility's decisionmaking process. Public interest groups are becoming increasingly active in specific utility proposals to site new facilities or obtain rate relief. The economic, environmental, and social impacts of electric power programs have become so great that public participation has contributed to some delays in getting additional facilities built. While public participation in the planning process has been minimal, it can become an important prerequisite to power system development. Obtaining the views of other interested parties and resolving any conflicts early-on in the planning process could avoid many adversarial proceedings which can later occur in the regulatory process.

FIGURE 1

PRICE OF ELECTRICITY TO THE ULTIMATE CONSUMER
Total Electric Utility Industry
(Including Alaska and Hawaii Since 1960)



SOURCE: EDISON ELECTRIC INSTITUTE STATISTICAL YEARBOOK OF THE ELECTRIC UTILITY INDUSTRY FOR 1978

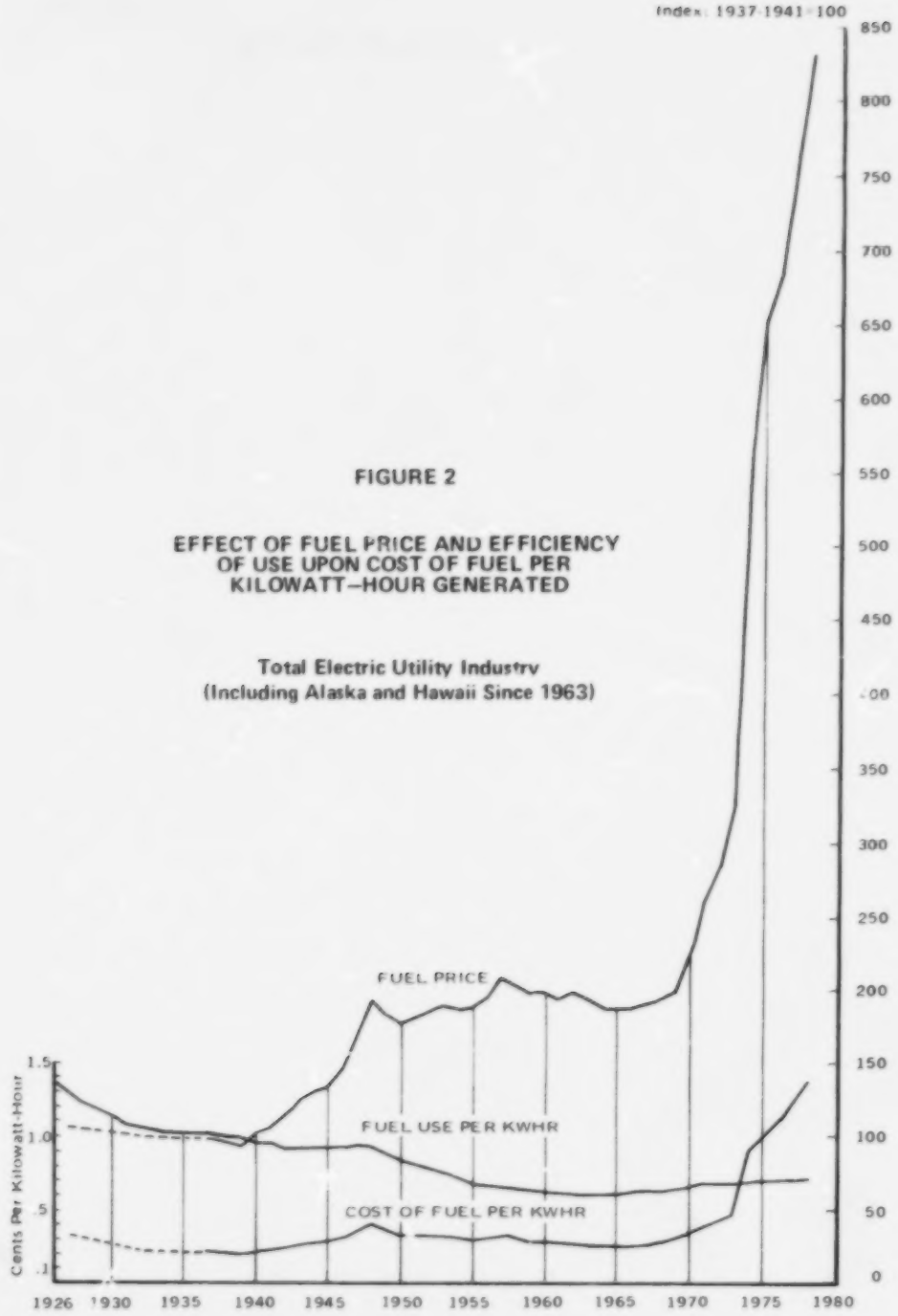


FIGURE 2

EFFECT OF FUEL PRICE AND EFFICIENCY OF USE UPON COST OF FUEL PER KILOWATT–HOUR GENERATED

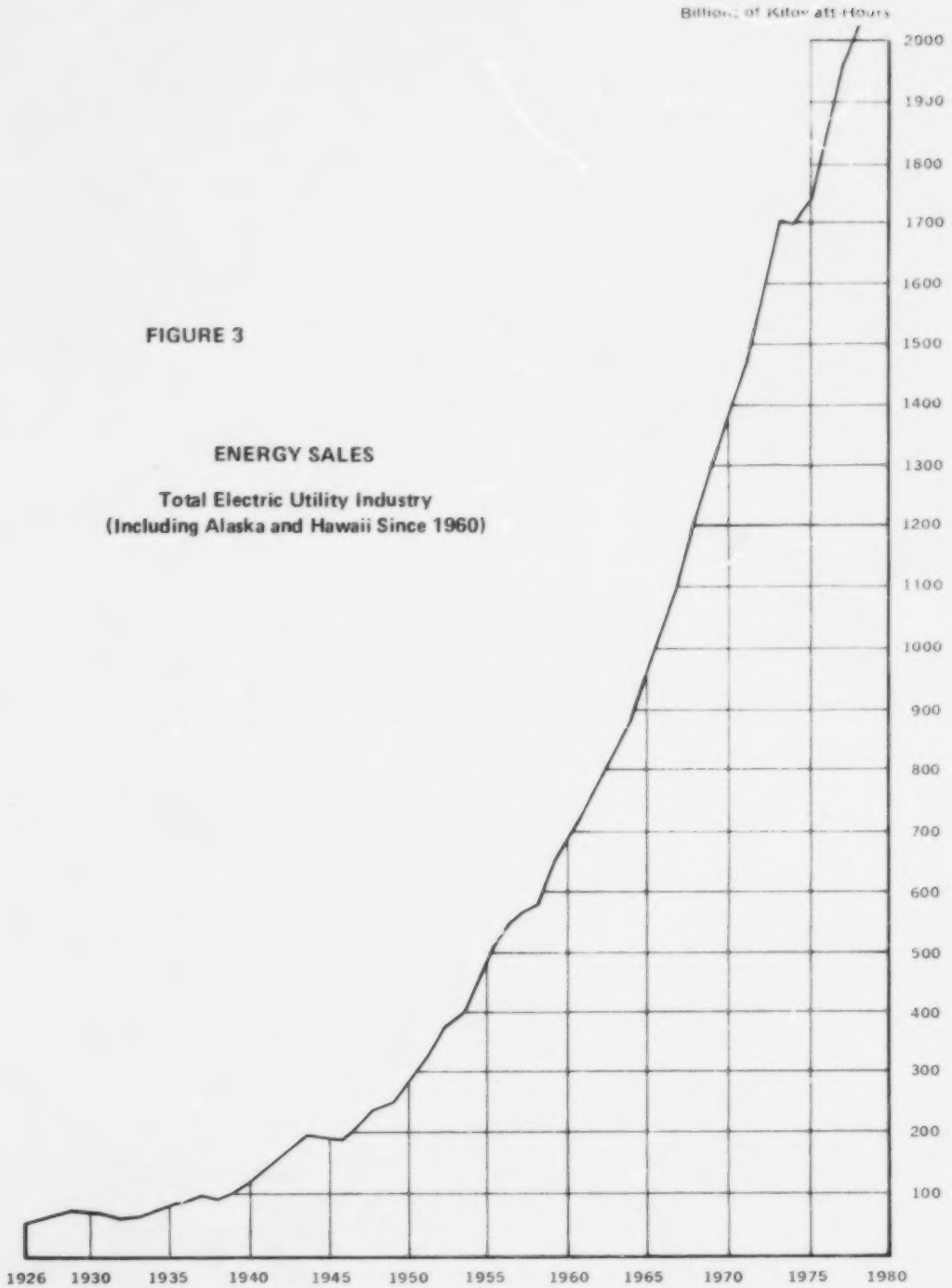
Total Electric Utility Industry
(Including Alaska and Hawaii Since 1963)

SOURCE: EDISON ELECTRIC INSTITUTE STATISTICAL YEARBOOK OF THE ELECTRIC UTILITY INDUSTRY FOR 1978

FIGURE 3

ENERGY SALES

Total Electric Utility Industry
(Including Alaska and Hawaii Since 1960)

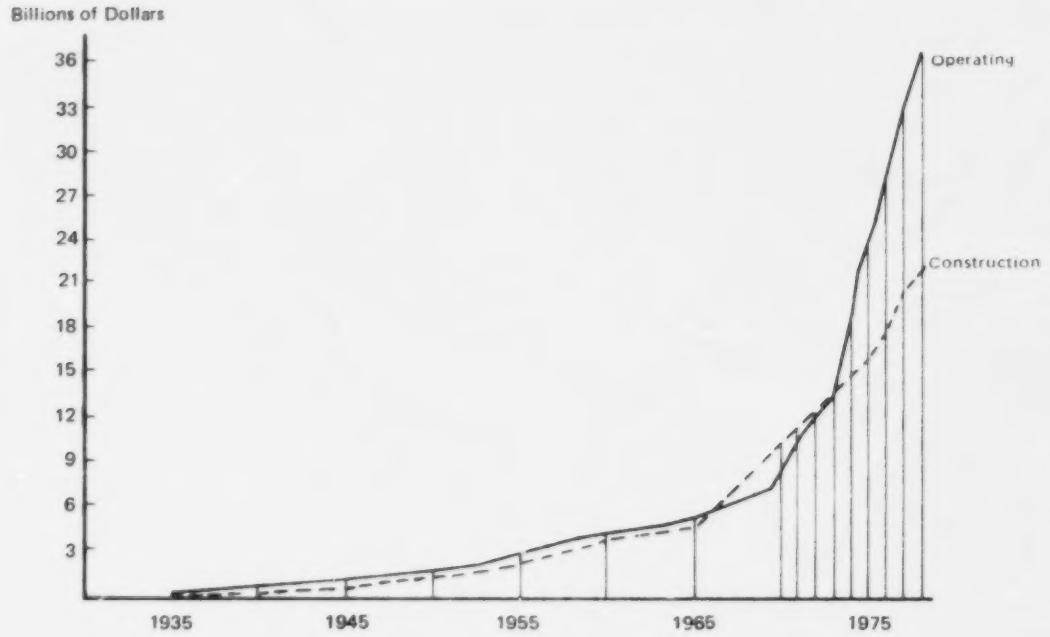


SOURCE: EDISON ELECTRIC INSTITUTE STATISTICAL YEARBOOK OF THE ELECTRIC UTILITY INDUSTRY FOR 1978

FIGURE 4

TOTAL OPERATING EXPENSES[a] AND CONSTRUCTION EXPENDITURES[b]

Investor Owened Electric Utilities (Excluding Alaska and Hawaii)



a/ OPERATING EXPENSES INCLUDE PRODUCTION, TRANSMISSION, DISTRIBUTION, CUSTOMER ACCOUNTS, SALES, ADMINISTRATIVE, AND GENERAL.

b/ CONSTRUCTION EXPENDITURES ARE, IN GENERAL, THE AMOUNT SPENT FOR NEW CONSTRUCTION OF ALL KINDS INCLUDING REPLACEMENTS, ADDITIONS, AND BETTERMENTS (BUT NOT MAINTENANCE OF EXISTING PLANTS), AND REAL ESTATE ACQUISITION AND ALL NECESSARY EQUIPMENT.

SOURCE: EDISON ELECTRIC INSTITUTE STATISTICAL YEARBOOK OF THE ELECTRIC UTILITY INDUSTRY FOR 1978, HISTORICAL STATISTICS THROUGH 1970.

CHAPTER 3

DEMAND FORECASTS AND STATE OVERSIGHT OF FORECASTS NEED IMPROVEMENT

Demand forecasts--projections of future demands for electricity--are the leading edge of electric power planning. Debates over the need to construct new generating facilities usually involve the credibility of forecasts and forecasters. Although the economic, environmental, and social impacts of new powerplants have greatly increased the importance of demand forecasting, few States have developed sufficient analytical capabilities to ensure that utility forecasts are credible.

Within the Nation, there is considerable uncertainty over what future electricity demand will be. Many utilities have lowered their forecasted growth rates almost every year since 1975. 1/ Utility data, submitted to DOE in 1980, estimate that the peak demand for electricity will grow at an average annual rate of about 4.3 percent through the year 1989. 2/ DOE projects a 2.06-percent peak demand forecast through 1983 to more accurately reflect what appears to be a continuing trend towards lower growth rates. 3/ A forecast prepared in 1980 by the Electric Power Research Institute estimates that the demand for electricity will grow at least 3.4 percent annually for the remainder of this century. The Edison Electric Institute (EEI), which acts as a representative for investor-owned utilities, anticipates that industry must construct powerplants to keep pace with an electrical load growth rate of 2 to 5.1 percent through the year 2000. 4/ A National Research Council report 5/ suggests that an average annual growth rate of 4 to 5 percent should be used as a guideline for prudent planning.

1/To understand the impact of demand projections, a 3.2-per cent average electrical growth rate from 1978 to 2000 would double the Nation's electrical generating capacity.

2/"Electric Power Supply and Demand for the Contiguous United States 1980-1989."

3/Ibid.

4/"Economic Growth in the Future-II," Executive Summary, Edison Electric Institute, 1980.

5/"U.S. Energy Supply Prospects to 2010," report of the Supply and Delivery Panel to the Committee on Nuclear and Alternative Energy Systems, National Research Council, 1979.

In comparison, the projected growth rate for overall energy demand tends to be lower than for electricity. A 1979 Council on Environmental Quality report 1/ expects that energy demand will increase from 1.5 to 2.5 percent annually through the year 2000. A Department of Commerce study 2/ projects that energy consumption will grow at approximately 2 percent through the year 2000. In addition, a report prepared by the Energy Project at the Harvard Business School 3/ suggests that energy demand could grow substantially lower than historic rates if aggressive conservation programs are undertaken.

While many other factors are considered in electric power planning, demand forecasts are the critical starting point in determining whether additional capital investments should be made to meet future growth in demand. The magnitude of these investment decisions and their consequences make it critically important that forecasting be as reliable as possible.

To meet a projected 4.3-percent peak demand growth through 1989 would require a net additional generating capability of about 233,500 MW 4/ at a cost approaching $333 billion. 5/ Clearly, the accuracy of the utilities' projections is of tremendous concern to consumers and policymakers. A difference

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1/"The Good News About Energy," Council on Environmental Quality, 1979.

2/"Forecast of Likely U.S. Energy Supply/Demand Balances for 1985 and 2000 and Implication for U.S. Energy Policy," Department of Commerce, Jan. 20, 1977.

3/"Energy Future," Report of the Energy Project at the Harvard Business School," edited by R. Stobaugh and D. Yergin, Random House, July 1979.

4/According to "Electric Power Supply and Demand for the Contiguous U.S. 1980-1989" the installed generating capability (summer) of about 544,500 MW in 1979 will increase to 778,000 MW (planned regional resources) in 1989.

5/This cost figure is based on statistics from EEI and the National Electric Reliability Council. EEI cited that the cost for additional generating capacity represents about 65 percent of the total utilities' capital outlay for new facilities. Even if electricity growth were reduced, an additional investment for transmission and distribution facilities would be required to handle the growth of customers and increased power exchanges.

of 1 percent in the projected annual growth rate for national electricity consumption over this period could reduce or add about 75,000 MW capacity to the Nation's inventory of power resources. The cost implications of such a difference would exceed $108 billion, or about $3.6 billion per year each to the commercial, industrial, and residential sectors.

Utility customers ultimately pay for the results of over and under forecasting--through higher rates for idle capacity or through lack of electricity. Because forecasting is so important to consumers and to power planners faced with billion dollar decisions requiring very long leadtimes, utility officials and State regulators must see to it that demand forecasts are developed with at least the best data and methodologies available. Without such use, and in conjunction with uncertainties inherent in a forecast (e.g., supply interruptions, effects of Federal policy changes, recessionary implications), the credibility of forecasts may diminish.

TRADITIONAL FORECASTING METHODS ARE NO LONGER APPROPRIATE

Historically, the electric utility industry has operated in a uniquely stable planning environment. Throughout the 1950s and 1960s, utilities' forecasts of future electric loads were based on relatively simple techniques and produced reasonable results. During these two decades electricity consumption grew rather steadily, and most utilities used trending methods to forecast future power needs. Factors that would strongly influence electricity consumption, such as the rates charged consumers, moved in a fairly predictable and regular fashion. The trending methods used for forecasting were appropriate to the conditions of the time; energy was cheap, economic growth was steady, and the relative energy prices were stable. Under these circumstances there was little likelihood of dramatic changes in projecting electricity demand.

As shown in chapter 2, the planning environment began to change in the early 1970s. Traditional forecasting methods (trending) that relied heavily on the extrapolation of historical consumption patterns failed to produce reliable results. Questions were raised about the long-term growth rate of energy consumption. The possibility evolved for the first time that a new powerplant might not be needed for many years after completion. Rapid price increases, vulnerability of supplies, and environmental problems stretching the completion period of generating capacity, grew at exactly the same time that electricity loads became increasingly difficult to forecast. As a result, the consequences of bad forecasts grew enormously.

BETTER TECHNIQUES ARE AVAILABLE

Because traditional forecasting methods are ill-suited in today's rapidly changing enery climate, considerable attention is being given to developing more sophisticated forecasting methods. Applying such techniques should provide a better basis for projecting electricity demand. These methods attempt to estimate the behavioral response of consumers to changes in the price of electricity, the price of competing fuels, and general economic activity, and also analyze electricity consumption of various appliances or production processes.

Two forecasting methods currently share the spotlight: the econometric approach, and the engineering or end-use approach. Econometric forecasting models are based on assumed relationships between electricity consumption and general demographic and economic variables such as gross national or State product, prior years' electricity sales, the prices of electricity and competing fuels, and population. Statistical methods and historical data are used to predict the response of power consumers to changes in these variables. Econometricians focus on determining how demographic and economic changes impact on the demand for electricity.

The engineering or end-use approach relies on a detailed enumeration of all energy-using equipment that is expected to be functioning during the forecast period. A use rate is then applied to each type of equipment to forecast total electricity consumption. The end-use method also provides a good basis for accounting for the actual savings from such conservation measures as they are implemented over time.

Both new forecasting methods have strengths and weaknesses. The econometric approach requires a much smaller data base and provides a superior means of assessing the effects of rate changes. However, econometric models do not take into account how electricity will actually be used by the ultimate consumer. Econometricians assume there is a relationship between general economic and demographic variables and electricity demand growth, and that this relationship will be generally the same in the future as it was in the past. Since econometric models are based on historical data, they are not well suited to capture the effects of new technologies or radical changes in consumer behavior. Also, they are unable to reflect the influence of energy efficiency standards and other non-price demand reducing measures. Although the end-use approach can help fill these voids, it requires an extensive amount of data

on electricity-using equipment. The end-use approach does offer a superior means of calculating the effects of mandated conservation measures, such as appliance efficiency standards.

A 1979 study prepared by the Energy Modeling Forum at Stanford University 1/ demonstrated that various end-use and econometric models have substantially different response rates to increases in the price of electricity or competing fuels, load management by time-of-day pricing, and mandated appliance efficiency and housing construction standards. The Stanford study recommended that end-use and econometric approaches be integrated to capture the strengths of both approaches in forecasting. According to the Stanford study, both end-use and econometric models would benefit from improved data bases. The study concluded that lack of data is a major obstacle to quick implementation of the more detailed forecasting models by utilities. Improved data are needed for items such as load characteristics for home appliances, further disaggregation of consumption by industry, and customer response to alternative pricing structures.

Regardless of the methods used, forecasts are based upon assumptions about uncertain future conditions. For that reason, conflicting forecasts of future demand are often developed by groups using similar methods and data. Relying on a single forecast as a planning tool has some real dangers--particularly since the electric power industry is presently going through a period of rapid and substantial change. By using a single forecast to develop its plans, a utility runs the risk of committing itself to one course of action without exploring the contingencies of forecasting error. To explicitly recognize the uncertainties inherent in forecasting, a range of forecasts can be developed based on different assumptions. This allows power planners, regulators, and consumers to explore the implications of high, low, and most likely growth rates.

Developing a range of alternative demand projections recognizes that there are substantial uncertainties in any long-term forecast and that projections based on different assumptions can vary significantly. In addition, uncertainties in the scheduled availability of new units (e.g., labor

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1/"Load Forecasting: Probing the Issues With Models," by the Energy Modeling Forum, Stanford University for the Electric Power Research Institute, Apr. 1979.

strikes), utilities planning for capacity in excess of projected demand to meet such delays, and altering construction schedules to meet actual demand are factors which must be considered in the utilities' decisionmaking process. A range of projections can show planners how sensitive their forecasts are to uncertainties in the economic or demographic conditions, conservation, and emerging technologies. This approach can also provide for easier modification in plans as contingencies become realities, and it tends to guard consumers and power planners against long-term decisions that could result in substantial overbuilding or underbuilding of capacity.

UTILITIES CAN IMPROVE THEIR FORECASTING PRACTICES

While some progress has occurred, utilities' forecasting practices can improve. All utilities within a State do not use the same type of forecasting model. The choice of one forecasting technique or the combination of more than one technique is affected by the relative size of a utility, the expertise available to it, and the degree of concerns by the public and their representatives. The planning methods chosen by the utilities also reflect the characteristics of their individual system (e.g., diversity of load, geography, fuel mix, and financial, environmental and regulatory climate) and allow for an exchange of information among utilities on the various planning approaches. Our questionnaire results showed that some utilities still rely on traditional forecasting methods, while other utilities use either econometric or end-use methods, or both. Many utilities' forecasts are not explicitly accounting for such important factors as the price of electricity, the prices of competing fuels, and the impacts of conservation measures. In addition, utilities in only 10 of 42 responding States are developing a range of possible growth rates for State regulators to review.

Some utility forecasting capabilities could be expanded to employ better available methods and assumptions to more explicitly deal with uncertainty and other key factors, such as price and conservation that can impact the future demand for electricity. At the present time, utilities using the more sophisticated techniques are relying primarily on the econometric model. Use of a combination of econometric and end-use methods in concert with development of the necessary data bases would allow utilities to correct a number of the weaknesses in their present forecasting practices. The full impact of utilities using either the end-use or econometric methods, or both, will not be felt until sometime in the future when current utility plans are implemented and their results compared to actual demand.

STATE INVOLVEMENT IN FORECASTING DEMAND SHOULD BE INCREASED

States, in general, perceive it as their responsibility to ensure the development of realistic electricity demand forecasts; however, the trend toward greater State involvement is less than optimal. To date, while State involvement or lack of involvement in power planning decisions has not resulted in serious or long-lasting power outages, uncertain future conditions should necessitate increased State participation to fulfill their responsibilities without inequities to the consumer. Some States that increased their forecasting capabilities and their involvement in evaluating utility forecasts, developed significantly lower estimates of future power needs than their utilities. However, while States purport to evaluate utility assumptions, States generally do not provide guidelines to be followed by utilities in forecasting demand, prepare their own forecasts, or encourage public involvement in the planning process

The States' ability to effectively evaluate utility forecasts is questionable. While States generally indicated that validation of key assumptions was their primary means of evaluating utility forecasts, most of the States we contacted have not significantly increased their ability to evaluate utility forecasts. Assumptions about important factors such as the price of competing energy sources, the future price of electricity, and the impact of conservation programs can significantly affect demand forecasts. However, when we asked if utilities' forecasts contained explicit assumptions about how demand for electricity will be affected, most of the States indicated that their utilities did not make such assumptions explicit in their forecasts. (See table 1.) This can occur because (1) most electric utilities make their own decisions about what methods and assumptions they will use in preparing demand forecasts and (2) only six States have indicated they have furnished their utilities with guidelines providing minimum criteria to be followed in forecasting demand.

Table 1

Are Assumptions Made Explicit in Utility Forecasts?

Assumption	States responding				
	No	Yes	For some utilities	Do not know	Total
Price of substitute energy sources	16	16	8	1	41
Price of electricity	17	14	9	1	41
Conservation programs	15	15	8	3	41

Some States continue to rely heavily on utility forecasts and to approve utility investment decisions with minimal scrutiny of forecasting practices and assumptions. In the State of Washington, for example, utilities do not have to justify the need for new powerplants to any State agency. None of the State energy organizations--the utility commission, the energy office, or the siting council--evaluates utilities' forecasts or prepares independent forecasts. Similarly, electric utilities in Louisiana do not have to justify the need for new powerplants. The Louisiana Public Service Commission does not require the electric utilities to submit long-range forecasts to justify the need for new powerplants. The utilities, however, as a matter of practice, do submit forecasts but generally do so after they are committed to building the new plants. The Public Service Commission does not prepare independent forecasts and has not developed the capability to analyze and evaluate the utilities' forecasts.

States vary in their preparation of demand forecasts. Of 41 responding States, only 19 had developed independent forecasts or analyses to test the reasonableness of their utilities' projections. The other 22 States did not prepare analytical data for use by State regulators evaluating the utility forecasts. Of the 19 States which prepared independent forecasts or analyses, most developed demand projections for the next 10-year period significantly lower than their utilities--in only 2 States were the results close to those of the utilities. The major factors identified as causing different forecast results were differing assumptions regarding (1) population growth, (2) economic growth, (3) the impact of the price of electricity on demand, (4) the impact of conservation, and (5) estimates of personal income. Ten States also attributed varying results, at least in part, to the use of different forecasting methodologies.

Some States have acted to increase their forecasting capabilities and their involvement in evaluating utility forecasts. The California legislature passed legislation in 1974, requiring the California Energy Commission to prepare an independent forecast, and the State's utilities to prepare forecasts based on Commission-developed forecasting methods. The Energy Commission and the utilities complied with this directive, but the Commission adopted its staff's forecasts for four of the five major utilities because of weaknesses in the utilities' forecasts. These weaknesses included inadequate accounting for conservation savings and under-estimation of future electricity prices. The utilities relied on predominantly econometric methods, while the Energy Commission used a combination econometric and detailed end-use model for its forecast. The Energy Commission concluded that the utilities' forecasts were unacceptable for power supply planning and directed the utilities to revise their supply plans based on the Commission's adopted forecast. Subsequently, the utilities lowered their 20-year supply plans by 8,000 MW, the equivalent of about 8 large powerplants.

The utilities in North Carolina have also adjusted their forecasts as a result of that State's involvement in the forecasting process. The North Carolina Utilities Commission requires electric utilities to annually submit 10-year load forecasts and generating capacity plans and to biennially submit 20-year forecasts and expansion plans. By law, the Utilities Commission must analyze these forecasts and estimate the future growth in electricity demand and the need for future generating capacity. In December 1978 the Commission issued its 1978 annual electric load forecast which predicted a significant reduction in the electricity demand growth rate for the period 1978-92. For one utility, the Commission forecasted a 5.4-percent annual peak-load growth rate through 1992, down from the Commission's 1977 forecast of 6.7 percent. For another utility, the Commission forecasted a 5.2-percent annual growth rate, down from its 6.88-percent forecast made in 1977. These two utilities account for 95 percent of the electricity generated in North Carolina. The Commission's independent forecast reflected major reductions in peakload growth resulting from conservation by all customers and load management in the commercial and industrial sectors. According to a Commission official, as of January 31, 1980, the Commission's decision was still pending on what adjustments the utilities would have to make to their powerplant construction schedule due to the lower forecasts. However, one of the utilities announced in January 1980 that it planned to defer by 3 years each of its plants scheduled for completion after 1985 because of lower growth rates expected for electricity.

In Wisconsin, the Public Service Commission actively participates in the electricity forecasting and supply planning process. It does this by (1) analyzing the utilities' forecasts and supply plans, (2) preparing its own independent forecasts, and (3) conducting public hearings. In the spring of 1979 the Public Service Commission, after reviewing numerous forecasts and conducting extensive public hearings, disapproved the plans of several utilities to construct a $1.4 billion, 1,100 MW nuclear generating plant. The Commission rejected this plant primarily because the utilities could not justify the need for such a large facility. In supporting its decision, the Commission stated that the utilities' forecasts did not properly consider the effects of load management, rate reform, conservation, and alternative energy sources. The Commission said the consideration of these four factors is a condition precedent for any reliable long-term forecast.

While States' ability to effectively evaluate utility forecasts is questionable and States generally do not provide guidelines to utilities in forecasting demand, nor prepare their own forecasts, most States also have not yet developed an effective method for involving the public in electric power planning. However, a majority of States said they perceive it as their responsibility to ensure public participation in electric utility planning and policymaking. 1/

We asked States if public hearings and other communication forums have been established to encourage citizen participation in planning the States' electrical energy future. Of 41 responding States, 18 said such forums or hearings had not been established for the purpose of citizen participation in electricity planning. Another 18 States said citizen participation could occur during rate or siting hearings. However, these hearings would occur after decisions were made on the need for power (forecasting demand) and how to satisfy that need (constructing a new facility, conservation, or developing an alternative) and would therefore not lend themselves to a thorough examination of the long-term issues within a comprehensive State planning system.

In addition, while 32 States purport to prepare an independent demand forecast and/or validate utility

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1/This opinion was primarily applicable to investor-owned utilities. Less than 25 percent of the responding States believe they have a legal responsibility for assuring public involvement for both investor-owned and publicly owned utilities. (See appendix I.)

forecasting assumptions, their role in encouraging public participation is minimal. Only six States purport to have hearings or communication forums to encourage citizen participation in the States' electrical energy future.

CHAPTER 4

STATE OVERSIGHT DOES NOT ASSURE ADEQUATE CONSIDERATION OF ALTERNATIVES IN ELECTRICITY PLANNING

Most States lack assurance that the full range of power supply/demand options--particularly alternatives such as conservation, load management, cogeneration, and renewable energy sources--are thoroughly studied and implemented when more cost-effective than conventional generation. The regulatory reviews being conducted by most States do not assure consumers that their future power needs will be met at the lowest economic, environmental, and social costs.

States, in general, asserted that it was their responsibility to assure that the costs and benefits of alternative methods of meeting future power needs are evaluated and compared before capital investment decisions are made. However, few States have gathered sufficient information to adequately assess the potential contributions available from alternatives. Many State regulatory officials were dissatisfied with the progress their electric utilities have made in pursuing alternatives to new powerplants. In addition, although most States purport to have the authority to require utilities to study and implement cost-effective projects or practices, few have exercised this authority. Furthermore, most States have not developed new economic incentives to encourage electric utilities to pursue innovative options which--although beneficial to consumers--could reduce or constrain utilities' profits under existing regulatory policies.

Based on estimates from 25 States, it appears that electric utilities are planning to build nuclear and coal generating plants to meet most load growth for the remainder of this century. Only two States indicated that their utilities were planning for alternatives such as conservation, load management, cogeneration, and renewable energies to make more than a 10-percent contribution in balancing supply and demand through the year 2000. According to the utility industry, it will implement those programs that are proven to be cost effective. Although electric utilities in most States have initiated or experimented with various conservation, load management, and rate reform programs, it appears that the utilities expect minimal contributions from these alternatives. According to EEI, the alternatives will not provide more than 5 to 10 percent of the total requirement.

Alternatives, such as conservation and renewable resources, to nuclear and coal-fired generating facilities,

offer considerable potential for helping to balance electrical supply and demand at the lowest economic, environmental, and social cost to consumers. For example, demands for electricity can be lowered without discomfort or disruption by insulation and weatherization of buildings; peakload, time-of-use, or marginal cost pricing initiatives; load management devices; and decentralized technologies such as passive solar architecture, solar water and space heating, and wood stoves. Additionally, renewable energy sources can provide generating capacity in the form of small- and medium-scale wind energy systems, small-hydropower developments, biomass-fueled generating plants, and geothermal stations. These alternative energy sources provide smaller increments of power than nuclear or coal-fired plants, generally require less capital and shorter construction schedules, and coupled with lower demand growth may defer or alter the need for large central power generation. Many of them also offer the advantages of diversity and reduced environmental/social impact. In many power systems where plans to construct large thermal powerplants are being canceled or greatly delayed, these options can help balance power supply and demand in the near term. The potential contributions of these alternatives are discussed below.

ALTERNATIVES COULD MAKE SIGNIFICANT CONTRIBUTIONS

Many officials in electric utilities and State regulatory agencies tend to dismiss the potentials of alternatives to building additional powerplants. At best, those who admit that significant potentials exist in such alternatives doubt that these options can make meaningful contributions before the year 2000. Our review indicated that, for some alternatives, these assessments are unduly pessimistic. In the paragraphs below we have summarized evidence which leads us to believe that some alternatives already deserve serious consideration by power planners and regulators.

Conservation

Energy conservation requires more efficient energy use and some modest lifestyle adjustments such as lowering thermostats in the winter, raising thermostats in the summer, and turning off unneeded lighting. Energy conserving measures make homes, businesses, and industrial processes more energy efficient--less energy is needed to produce essentially the same results. Typical conservation measures include improving residential insulation and weatherization, using more energy-efficient appliances, adjusting thermostats, modernizing production facilities, and recyling materials. Saving energy

through conservation--as the administration's National Energy Plan points out--constitutes the least costly, most flexible, and most environmentally acceptable energy resource available.

There is general agreement on the need to conserve energy, but no unanimity of opinion on how much electricity can be saved by conservation. Several recent studies show the potential could be substantial.

--The Electric Power Research Institute estimated that up to 40 percent of future electric and nonelectric energy demand could be eliminated by the year 2000 if nationwide conservation measures were adopted. The Institute considers 20 percent to be a reasonable target.

--The Council on Environmental Quality 1/ reported in 1979 that increases in the productive efficiency of energy which is possible with today's technology would allow the Nation's economy to operate on 30 to 40 percent less energy. The conservation measures associated with these efficiency improvements were characterized as technically feasible and economic when compared on a life-cycle cost basis with the cost of producing more energy.

--The 1979 Harvard Business School report "Energy Future" 2/ stated that if the Nation were to make a serious commitment to conservation, it might consume 30 to 40 percent less energy than it does now, and still enjoy the same or even higher standard of living. The report refers to conservation as the cheapest, safest, and most productive energy alternative available in large amounts.

Load management

Load management is a technique used by utilities to reschedule electricity use so as to reduce peaks and valleys in their loads. Since the demand for electricity varies between different times of the day and between seasons,

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1/"The Good News About Energy," Council on Environmental Quality, 1979.

2/"Energy Future: Report of the Energy Project at the Harvard Business School," edited by R. Stobaugh and D. Yergin, Random House, July 1979.

electrical generating facilities are built and designed with enough capacity to meet the peaks--the times of heaviest demand on the system. Standby generators, used in most power systems to meet peak demands of short duration, are inefficient and expensive to operate. Load management can save consumers money by reducing the need for peaking generation, and allowing utilities to meet more energy demands with economical baseload plants. Load management techniques can also help reduce reserve requirements and improve the reliability of electrical service.

Load management techniques include cycling appliances, rescheduling use of electrical equipment for off-peak hours, and imposing time-of-use rates. Appliance cycling involves installing remote control devices or timers on appliances, such as air conditioners, space heaters, and water heaters, which contribute heavily to peakloads. By using these remote control devices, a utility can shut-off the appliances for brief periods and thereby reduce peakloads. Time-of-day rates that are based on the cost of new generating capacity can also help reduce peakloads by increasing the price of energy consumed during periods of heavy demand.

Available evidence indicates that load management potential could be significant. For example, one domestic utility, Detroit Edison, adopted a program in 1968 to control customers' water heaters. The system has reduced peak demand, conserved energy, averted the need for new peaking facilities, and saved money--savings in 1977, for example, were about $1.7 million. A 1977 Oak Ridge National Laboratory report 1/ covering a study of 63 other domestic load management programs found excellent customer acceptance regardless of the use of financial incentives.

In our previous report 2/ we noted the potential benefits of interruptible actions for the Tennessee Valley Authority system. Using a combination of remote control and timer equipment, we found that by installing load interruption capability in at least 50 percent of all electric water heaters in the region by 1985, would result in a decrease in peakload equal to about 1,000 MW of residential savings plus about 500 MW in the commercial and small industrial sector.

1/"Survey of Utility Load Management and Energy Conservation Projects," performed for the Oak Ridge National Laboratory by Energy Utilization Systems, Inc., Dec. 1977.

2/"Electric Energy Options Hold Great Promise for the Tennessee Valley Authority," EMD-78-91, Nov. 29, 1978.

Utilities can also save consumers money by charging rates which tend to flatten peakloads. A 1978 report by the Rand Corporation 1/ estimated that use of peakload pricing for industy could result in a 7.6-percent reduction in the peak electricity loads for the Nation using 1976 rates of energy conservation. According to Rand, shifting industry use from peak to off-peak hours would allow utilities to eliminate or defer construction of 28,000 MW of peaking capacity nationally, thereby achieving long-run savings in operating and capital costs of between $1.3 and $3.5 billion per year. The study concluded that such load changes would permit utilities to realize fuel savings of between $0.4 and $1.8 billion annually.

Cogeneration

Cogeneration, the simultaneous production of electricity and useful heat--usually in the form of steam for industrial processes--can increase power supplies and save energy by making more efficient use of fuels. Cogeneration is not a new concept. It is currently in wide use in Europe. However, in the United States, electricity produced through cogeneration declined from about 17 percent in 1950 to 4 percent in 1976.

Renewed interest in cogeneration in the United States has been stimulated because of dramatic rises in energy prices and the potential for reducing oil imports. For example, the Council on Environmental Quality's 1979 energy report noted that cogeneration can reduce by roughly 30 percent the amount of fuel required to generate electric power and steam in separate processes. Several recent studies cited in a 1979 Congressional Research Service report 2/ estimate that cogeneration could account for between 33,000 and 76,000 MW of electrical capacity by 1985. In our recent report on industrial cogeneration, 3/ we found that in 1985,

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1/"Projected Nationwide Energy and Capacity Savings from Peak-Load Pricing of Electricity in the Industrial Sector," Jan Paul Acton, Bridger M. Mitchell, and Willard G. Manning, Jr., The Rand Corporation, June 1978.

2/"Centralized vs. Decentralized Energy Systems: Diverging or Parallel Roads?" Congressional Research Service, prepared for use of the Subcommittee on Energy and Power, Committee on Interstate and Foreign Commerce, United States House of Representatives, May 1979.

3/"Industrial Cogeneration--What It Is, How It Works, Its Potential," EMD-80-7, Apr. 29, 1980.

the cogeneration capacity could approximate 10,400 MW with Government incentives for the three industries that account for 80 percent of the economically suitable steam for cogeneration--the paper and pulp, chemical, and petroleum refining industries. Another study cited by Congressional Research Service suggests that cogeneration capacity could increase to 200,000 MW by the turn of this century.

Cogeneration could contribute to our Nation's efforts to conserve valuable fossil fuels and in the long term, as the technology develops, emphasis should be placed on encouraging cogenerators to use coal. Economics is cited as the most important issue affecting cogeneration acceptance, however, other concerns include environmental, regulatory, and institutional considerations. Attainment of energy savings and the development of cogeneration as an energy conservation measure depends on the policy formulated at the Federal level.

Renewable resources and other alternatives

Many other alternatives exist which power planners and regulators should consider in their plans. Such consideration is especially important in power systems where plans to build large facilities have been abandoned or greatly delayed. Alternatives include windmills, hydropower projects, decentralized applications of solar hot water and space heating, geothermal, and biomass.

In June 1979 the President outlined a strategy for accelerating their use and set a goal of deriving 20 percent of the Nation's energy needs from solar and renewable resource by the year 2000. The 1979 report by the Energy Project at the Harvard Business School concluded that new technology is not required to achieve that goal.

While uncertainties persist about the potential and timing of many alternatives, some of these options are viable and should be thoroughly considered by utility executives and State regulatory officials in today's decision-making. For example, according to DOE, several of these technologies--including small hydropower, passive solar energy, solar hot water and industrial process heat--are commercially feasible for use at this time.

The Corps of Engineers 1/ has identified hydroelectric

1/"Estimate of National Hydropower Potential at Existing Dams," July, 1977.

potential from existing dams which could provide 54,600 MW of capacity through specific development. A recent Corps assessment of this study indicates that potential will be somewhat less than previously identified. The administration's "Domestic Policy Review of Solar Energy" 1/ noted that solar hot water systems can compete successfully in many regions against electric resistance heating; a number of solar systems installed by individual users are already cost-effective; and comprehensive and aggressive initiatives at the Federal, State, and local levels could meet the administration's 20-percent solar goal.

STATES ARE SLOW TO ADDRESS ALTERNATIVES

We asked States several questions focusing on alternatives to conventional generating facilities. Specific questions addressed the preparation of studies and identification of potentials. Although some alternatives deserve serious consideration by power planners, only limited studies have been performed and few assessed the potential contribution these alternatives can make. This lack of progress is rather surprising because many Federal programs emphasize the alternatives, and conservation and renewable energies are important ingredients of the National Energy Plan.

Of 36 States responding in the area of preparation of studies, we found that conservation information programs (15 States), energy audits (18 States), and low-head hydro (14 States) received the greatest amount of statewide study. For the remaining alternatives, including cogeneration, solar, load control devices, and geothermal, less than one-third of the 36 responding States have studies on a statewide basis.

Other States responded that studies were prepared on a utility service-area basis and not statewide. Such studies are most prevalent for pricing and rate structures, production improvements, grid developments, and conservation initiatives. In those States where alternatives have been studied on a utility service-area basis, the studies focus on individual utilities, do not purport to examine the potential alternatives beyond the direct control of a utility, and are not coordinated to identify overall statewide potential.

The States indicated that, in general, the alternatives have not received quantitative evaluation or significant potentials do not exist. In order to be useful for electricity planning purposes, studies of alternatives--either on a

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1/"Domestic Policy Review of Solar Energy," A Response Memorandum to the President of the United States, Feb. 1979.

statewide or service-area basis--should result in a reasonably accurate quantitative description of the alternative's potential contribution to balance future electricity supply and demand. Less than one-third (and generally less than one-fifth) of the 36 responding States had any opinion on the significance of the potential for any of the alternatives. Except for energy conservation audits, less than six States said that a significant potential for any alternative had been identified through studies.

The few States which are taking strong actions to ensure that alternatives are more fully considered in electricity planning have identified significant opportunities for making use of such options. The Wisconsin Public Service Commission, for example, has been pursuing time-of-day rates and load management programs since 1974 to reduce the rate of peak demand growth and to encourage more efficient use of existing powerplants. In 1977 after making an economic analysis of various load control strategies, the Commission concluded that load control techniques are cost effective when compared to new generating capacity. The Commission's report showed that the State's largest utility conducted tests on controlling water heaters and found favorable economics and high customer acceptance. According to a Commission official, that utility plans to control 150,000 water heaters by mid-1981 thereby saving about 130 MW of capacity. Participating customers will receive a rate discount for allowing the utility to turn off their water heaters for up to 5 hours during peak periods.

Another Wisconsin utility has tested the feasibility of controlling commercial loads, primarily air conditioners. According to the Commission, early results of that test showed nearly 100-percent customer acceptance even though no special rates or other incentives were offered. In 1978 the Public Service Commission ordered all utilities to implement feasible load management strategies as soon as possible. Wisconsin PSC officials estimate that load management and pricing measures will make a 10-percent contribution towards balancing electricity supply and demand in the State by the year 2000.

California is intently pursuing conservation as an alternate energy source. In 1974 the State legislature made conservation a matter of State policy. To meet this legislative mandate, the California Energy Commission has adopted several conservation regulations including efficiency standards for refrigerators, freezers, room air conditioners, water and space heaters, plumbing fixtures, and for residential and non-residential buildings. A 1979 Energy Commission analysis estimates that these conservation regulations should result in savings equivalent to 50 million barrels of oil and $1.7 billion by 1985.

Utilities in the State have lowered their 20-year forecasts about 10 percent to account for the anticipated impacts of such non-price conservation measures. Energy Commission staff members expect that such conservation measures already in place--existing State conservation initiatives and utility programs--will reduce electricity growth more sharply by about 15 percent.

The Commission staff recognizes that the conservation measures already in place are far from the limit of cost effectiveness. They believe that energy efficiency can be further enhanced by using more efficient appliances and further reducing heating and cooling losses. Given the price projections for conventional energy sources, the Commission staff believes these additional measures, such as tighter residential and commercial building standards, upgrading appliance efficiency standards, and using more efficient irrigation pumps, will prove to be cost effective and practical.

California's Public Utility Commission has ruled that conservation is to rank at least equally with power supply as a primary commitment and obligation of a public utility. The Commission stated that it will consider the imagination, vigor, and effectiveness of a utility's conservation program when reviewing the utility's rate of return. In at least one rate case, the Commission has enforced this policy by reducing a utility's rate of return for not showing adequate diligence and imagination in developing conservation programs.

California is actively pursuing several other alternatives. The State has performed studies which have identified significant potential for economical cogeneration (1,000 to 6,000 MW), geothermal stations, windmills, and other solar energy applications. The State is undertaking a vigorous program to explore the potentials and the barriers that must be dealt with if these options are to be implemented on a large scale. As with conservation, in a recent rate case, the California Public Utility Commission reduced the rate of return because the utility had not aggressively pursued cogeneration opportunities; the Commission advised the utility that in the future the effectiveness of its efforts to pursue such options could result in either a higher or lower rate of return allowed on its investments. To promote solar energy, the State Utility Commission issued an order in early 1980 requiring the four largest utilities to submit plans for financing installation of $500 million of solar hot water heaters (about 175,000 homes over a 3-year period).

NEW INCENTIVES ARE NEEDED TO ENCOURAGE USE OF ALTERNATIVES

Regulatory officials in many States are dissatisfied with

their utilities' progress in developing energy alternatives. Presently, utilities are not pursuing the alternative options for meeting electricity demand, indicating a negligible contribution from the alternatives by the year 2000. States generally are not imposing barriers for the development of the alternatives, but few States have provided economic or regulatory incentives to further encourage utility participation. In the absence of such incentives, most utilities may continue to shun the alternatives. Aggressively promoting the alternatives in lieu of promoting electricity use from conventional centralized sources may be counter-productive to utilities by reducing their potential for profits under existing regulatory policies or may alter the utilities' main responsibility of supplying adequate and reliable power.

The earnings of most investor-owned utilities are regulated as a function of their capital investments 1/--the larger the investment, the larger the potential for profits. Because of this regulatory approach, a number of the alternatives to conventional generation which tend to limit large utility investments could also limit the utilities' profit. For example, demand-reducing measures, such as conservation and pricing initiatives could substantially slow demand growth and reduce the need for new powerplants. Development of decentralized technologies such as solar water or space heating, low-head hydro projects, windmills, or cogeneration projects might also limit utilities' investment opportunities, and may not be conducive to long-term utility survival under the present regulatory climate.

In general, States have not restricted utilities' development of the alternatives. To date, States have relied primarily on the traditional processes but have generally not provided new incentives to encourage utilities' development and use of the alternatives. States have not discriminated between conventional generating options and the alternatives in allowing their utilities to add these investments to their rate base--30 States indicated there was no discrimination, and 9 States said they addressed this question on a case-by-case basis. States allowed their utilities to earn as much money for their shareholders on investments in conventional as well as the alternatives--37 States allowed their utilities to earn such a return, were not aware of any policy or did not have any policy to prohibit equal treatment (see table 2). States also responded that, in general, no financial investment barriers exist to discourage utility involvement

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1/Only those capital investments which can be properly included in the rate base will qualify to yield earnings. Utility growth will also be dependent upon a profitable return on investment.

with the alternatives (see table 3). The financial community is more concerned with the financial integrity of the utility, rather than the type (conventional or alternative) of investments.

Table 2

Can a Utility Earn as Much Money for Shareholders on Conventional as well as Alternative Investments?

	Number of States
Yes	29
Unaware of any problem or policy	4
No policy-address case-by-case	4
No	1
No comment	4
	42

Table 3

Do Financial Investment Barriers Exist to Discourage Utility Involvement with Alternatives to Conventional Plants?

	Number of States
No	14
Question has not arisen	13
Probably no	4
Address case-by-case	1
No comment	7
Yes	3
	42

Because these alternatives could threaten utilities' profit growth, we queried State regulators on (1) their authority to require utilities to study and implement cost-effective alternatives, (2) the exercise of this authority in the last 3 years, (3) types of actions taken, (4) types of incentives provided, and (5) satisfaction of progress.

Regarding conservation and/or load management programs, nearly all responding States (39 of 42) have the authority to require utilities to study and implement cost effective conservation and load management practices. About 60 percent of the States have exercised this authority to some extent in the last 3 years (see table 4). Most of these activities involved

consumer information and loan programs for conservation, and peak load pricing programs to help flatten power loads. More than half the States indicated they were dissatisfied with the progress being made by their utilities in conservation and load management. However, States have not specifically established direct incentives or sanctions to encourage utilities to explore conservation and load management options. Of those States which used incentives or sanctions, they relied primarily on customer rate design techniques such as time-of-day pricing. Only one State (California) reported use of any new economic incentive (variance on the rate of return) to encourage utilities to pursue these options.

Table 4

In the Last 3 Years, Have States Exercised Authority to Require Utilities to Study and Implement Cost-Effective Alternatives?

Alternative	Yes, study and implement	No, neither study nor implement	Study only	No comment	Total response
Conservation and load management	26	7	8	1	42
Cogeneration and interties	8	28	1	4	41
Renewable energy projects	2	30	3	6	41

Similarly, about three-fourths of the States reported that they had authority to require their utilities to study and implement cost-effective cogeneration, interties, and renewable energy projects; fewer than one-fourth of the States had exercised this authority during the past 3 years (see table 4). About half of the States reported dissatisfaction with the progress their utilities were making in cogeneration and renewable energy projects. Furthermore, some States which indicated that they were satisfied with utility progress, did so even though their utilities had not undertaken any cogeneration or renewable energy projects during the past 3 years. Relatively few States reported use of new incentives to directly encourage utilities to pursue cost-effective cogeneration and renewable energy projects. The utility incentives included favorable treatment of research and development expenses, higher or lower rate of return based on utility performance, and expedited siting procedures.

Considerable controversy exists over the appropriate role for utilities to play in promoting conservation and renewable energy developments. Some Federal policymakers and State regulators advocate broad utility involvement in conservation and renewable energy resources. Others, including some consumer groups, have been opposed to utility involvement. The latter group perceive utilities as unchanging monopolies whose sole business is to sell electricity, not to conserve or reduce its use. Such consumer groups argue that utilities will not offer the highly motivated leadership needed to demonstrate the feasibility of conservation and unconventional energy programs. Some believe that increased utility involvement could restrict the introduction of new energy sources.

These consumer concerns deserve the continuing attention of State regulators. We also believe, however, that increased utility involvement--if properly structured--could greatly benefit consumers through improved financing of energy conservation and expedited development of alternative energy sources. Utility leadership and innovation appear essential to avoid the power shortfalls which could result from public unwillingness to support a rapid expansion of coal-fired and nuclear powerplants.

Presently, utilities have little positive financial incentives to promote energy conservation, solar, and other renewable energy sources. This situation must be weighed against the likelihood that without substantially greater utility involvement, it is unlikely that renewable energy sources and conservation will play a substantial role in balancing the supply and demand for electricity in the near future.

CHAPTER 5

FEDERAL EFFORTS NOT DIRECTED TO IMPROVING ELECTRICITY PLANNING

DOE recognizes it has the authority to assist States and utilities in improving the quality of State, regional, and utility power plans. No Federal energy agency has assumed such a responsibility. DOE officials recognize that problems exist in demand forecasting, assessment of feasible alternatives, and public involvement, but they have not taken a unified approach to address these problems. DOE officials advised us they have been hesitant to act because (1) electricity planning is considered a State and utility function and (2) Federal legislation does not require DOE to assist States and utilities in these areas.

Federal responsibilities for electricity are fragmented throughout numerous agencies. Few of the programs implemented by these agencies are specifically designed to improve electricity planning, although many of them impact indirectly on the planning function. Federal electricity programs are not coordinated through a set of common electricity planning objectives, policies, or evaluation systems. Under these conditions there is inadequate assurance that Federal efforts are responsive to the planning needs of electric utilities, State utility regulators, and power consumers.

Since electricity planning decisions are so important to the consumer and because the States and utilities are not well prepared to deal with the problems facing the utility industry, the Federal Government could play a more active role in helping States and utilities better carry out their electricity planning responsibilities. Because some electricity planning decisions may affect areas in more than one State, a regional and/or national planning perspective is needed. Existing legislative authority gives several Federal agencies, including the Department of Energy, Nuclear Regulatory Commission, and the Rural Electrification Administration responsibilities that could have an impact on electricity planning decisions.

DEPARTMENT OF ENERGY

Numerous DOE offices including the ERA, FERC, the Office of Conservation and Solar Applications, the Office of Resource Applications, the Undersecretary for Commercialization, and the Federal power marketing agencies such as the Bonneville Power Administration, perform activities which can impact on electric power planning.

Many of these activities encourage the development and support the use of alternative energy sources such as conservation, rate reform, load management, and renewable energy resources. However, DOE has not analyzed any of the programs to measure their direct impact on electricity planning. For the most part, these DOE efforts are having little impact on electric utilities' plans and States' oversight of those plans.

Economic Regulatory Administration

ERA is responsible for assuring the reliability of electric bulk power supply throughout the United States with the greatest economy and with conservation of natural resources. ERA is responsible for directing programs in the area of electric utility system planning, coordination, rate structure, and intervention. It also administers provisions of the Federal Power Act relating to long-range utility planning, system coordination, and interconnection. Responsibilities also include undertaking and supporting studies of electric rate structures and assisting State regulatory agencies to upgrade their technical expertise and develop needed staff capabilities. ERA is also responsible for intervening on behalf of DOE in Federal and State regulatory proceedings to advocate national policy in electricity. In addition, ERA can encourage (1) greater use of coal and other alternate fuels (including shale oil, biomass, and municipal, industrial or agricultural wastes, wood, renewable and geothermal energy sources) as primary energy sources through the Powerplant and Industrial Fuel Use Act and (2) conservation, efficient use of resources, and equitable rates to consumers through the Public Utility Regulatory Policies Act.

ERA officials told us that DOE has not assigned a high priority to improve electricity planning and has taken a rather passive role in dealing with the new problems confronting power planners. ERA officials said that States have the primary responsibility for overseeing utility planning activities, and States should continue to be the focal point for power supply planning. ERA added that a multi-State or regional approach to regulation of certain aspects of utilities' planning and operations may be more appropriate than State regulation. The officials pointed out that legislation does not require DOE to assist States and utilities in improving their planning practices. ERA believes its authority to be involved in utility planning stems from the Federal Power Act through promoting and encouraging voluntary interconnection and coordination for the purpose of assuring an abundant supply of electric energy throughout the Nation. Even though ERA recognizes that shortfalls exist in States' planning capabilities, they have been hesitant to act because of the States' concern that increased Federal

efforts might usurp the traditional State responsibilities for determining the need for power, siting generating facilities, and approving rates. ERA is also concerned with its liability if it helps in State planning decisions.

ERA officials agree that (1) many States lack the technical capability to adequately evaluate utility forecasts or prepare their own forecasts and (2) many States and utilities do not have the analytical skills and tools needed to adequately evaluate the various alternatives to coal and nuclear generating facilities. The officials also said that they endorse the development of a range of demand projections, utility forecasts should employ the best available methods and assumptions, and accessability to data and improved data bases are needed to support the more sophisticated econometric and end-use forecasts. ERA said end-use forecasting is needed to supplement existing techniques and more accurately estimate the effect of conservation measures. ERA feels its role should promote the state-of-the-art tools and not develop new models for forecasting.

In addition, ERA officials acknowledge that lack of early public participation has contributed to delays in siting new plants because questions are frequently raised in siting hearings which should have been resolved in earlier planning stages. Although ERA has authority to intervene in electricity issues, it has never used this authority to intervene on behalf of better electricity planning--to assure better forecasting or more thorough evaluation of conservation or other energy alternatives.

Other DOE efforts

While ERA's involvement can be directly related to electricity planning, other DOE efforts indirectly impact on balancing electricity supply and demand.

FERC, based on mandates of the Federal Power Act and the DOE Organization Act, is responsible for the licensing of non-Federal hydroelectric projects. FERC also approves wholesale power rates for the transmission and sale of electricity in interstate commerce. Under the provisions of the Public Utility Regulatory Policies Act, FERC is responsible for prescribing rules to encourage cogeneration and small power production. According to FERC before licensing hydroelectric projects, it does not perform an independent forecast of the need for power but evaluates data submitted by the utility and intervenors and reviews the material in light of regional trends, State forecasts, staff knowledge of forecasting technique and other available data. The result is a staff finding as to a "band of reasonableness" for future load growth. FERC independently performs some cost

comparisons of generating options. FERC cited that it does not consider nongenerating options such as conservation and load management as potential alternatives since these options lack the ability to bring about predictable results.

DOE's Office of Conservation and Solar Applications, which administers provisions of the National Energy Conservation Policy Act, is responsible for programs encouraging conservation of all energy, including electricity and encouraging the application of all forms of solar energy, some of which can displace or generate electricity.

DOE's Office of Resource Applications, in conjunction with the Undersecretary's Commercialization Task Force, is responsible for the demonstration and application of various technologies, such as geothermal, and hydropower. While these technologies have direct impacts on electricity planning, they have been given little consideration in utilities' or States' plans for balancing electricity supply and demand, and DOE has not analyzed the impact these programs could have on electricity planning.

DOE has identified technologies which are ready for commercial development but has not determined how these technologies should be integrated with State or utility planning activities. Several of these technologies (small hydro, solar hot water) are viable alternatives to conventional generating facilities. Beginning in March 1979, DOE began marketing its work on emerging technologies to States, focusing on about four technologies per State. These technologies do not include important nongeneration options such as rate reform and load management.

The Federal power marketing agencies are responsible for marketing electricity produced at Federal hydroelectric projects. These agencies, for the most part, have not been major contributors to electricity planning. We pointed out in previous work 1/ concerning the Bonneville Power Administration in the Pacific Northwest that this specific region lacks a central power planning authority and that Bonneville should be a key element in developing such plans.

DOE has authority under the DOE Organization Act of 1977 (P.L. 95-91) to undertake a planning role focusing on improving State and utility planning practices. 2/

1/"Region At The Crossroads--The Pacific Northwest Searches For New Sources of Electric Energy," EMD-78-76, Aug. 10, 1978.

2/DOE agreed it has the authority to undertake this role. (See p. 53).

The Act states Congress' objective (section 102) that DOE would become the focal point for solving the Nation's energy problems and for developing plans and programs for domestic energy production. The Congress also envisioned State and local governments cooperating with the Federal Government in the development and implementation of national energy policies and programs. The legislation aimed to consolidate into one department, energy supply development responsibilities including electric power supply. The Act assigns various responsibilities to the Department's assistant secretaries (section 203). These include functions "dealing with the management of all forms of energy production and utilization, including * * * electric power supply." In the Senate Committee report, the Congress envisioned that electric power supply would be one of the Department's wideranging resource allocation responsibilities.

Relatedly, the DOE Act (section 301) transferred to DOE the Federal Power Commission's authority under the Federal Power Act (section 311) to conduct investigations relating to electrical energy. Assignment of this function to DOE, rather than FERC, which obtained the Federal Power Commission's licensing and regulatory responsibilities, would appear to indicate that the Congress recognized the central role DOE would have in dealing with the Nation's problems of electricity supply and production. To assist the Congress in its legislative responsibilities, DOE is directed to conduct investigations and report to the Congress on the Nation's electrical systems and to gather and to keep current information on the Nation's production of electricity. As previously discussed, DOE has not taken a comprehensive approach towards improving electricity planning.

NUCLEAR REGULATORY COMMISSION

NRC, under the Energy Reorganization Act, is responsible for the licensing and regulation of private nuclear facilities from the standpoint of public health and safety. Under the terms of the National Environmental Policy Act of 1969, the NRC, before licensing a nuclear powerplant, must assure (1) a valid need for the power to be provided, (2) alternatives to the proposed nuclear facility are examined, and (3) the nuclear plant is the best alternative for meeting the need for power.

Before issuing a construction permit for a nuclear plant, the NRC must review an applicant's treatment of historic and projected electricity consumption in the applicant's service area and compare the forecast to other generally available forecasts. NRC's review is intended to consider such factors as price of electricity, conservation and substitution, price

of alternative fuels, income, economic activity, saturation levels, number of customers, and weather. According to NRC officials, the NRC performs an independent assessment of forecasted growth in electricity consumption in determining when new facilities are needed to ensure a reliable supply of electric energy. NRC does not thoroughly evaluate all benefits and costs of all alternatives prior to licensing a plant. When evaluating alternatives to the nuclear option, NRC briefly looks at alternatives such as conservation, rate reform, and renewable energy sources. NRC officials advised us, however, that in their opinion the cumulative contribution from these sources would very seldom be sufficient to eliminate the need for a nuclear powerplant.

RURAL ELECTRIFICATION ADMINISTRATION

REA, under provisions of the REA Act of 1936, approves requests from power supply systems for insured loans and loan guarantees to construct electricity generating facilities. The amount of insured and guaranteed loans REA approved for power systems in fiscal year 1979 totaled about $5.5 billion.

In general, REA does not prepare an independent forecast but evaluates a system's demand forecast before approving financing for a generating facility. REA provides procedures and guidelines for REA borrowers in preparing forecasts of power requirements; however, this does not assure that forecasts will be accurate. The forecasts are based primarily on trending--using historical growth data as a basis for projecting future growth trends. REA suggests that the systems analyze such factors as population, appliance saturation levels, consumption patterns, and conservation; however, it does not prescribe any method for considering their impact on the forecasts.

Although REA requires power supply systems to prepare detailed feasibility studies of various alternatives to conventional generation, the alternatives studied are limited to those judged appropriate by REA and the borrowers during the exploratory planning phase. To assure that the most appropriate mix of supply alternatives is selected, the suppliers need to formally study and use all available alternatives. These include conservation, load management, and renewable energy sources.

Improved forecasting methodology and a more thorough assessment of the alternatives would provide beneficial input to REA in making its financing decisions and better protect the interests of rural power customers. REA is taking some corrective action. For example, REA is undertaking

studies of Supplemental and Alternative Generation Technologies for REA Financed Programs, and Methodololgy for Identifying Environmental Constraints in Power Plant Siting. Also, to improve its forecasting capability, REA has contracted with a private firm to review forecasting methodologies and techniques for the purpose of developing an REA forecasting manual by January 1981. In the future, suppliers and borrowers need to consider the impact of the recently initiated REA conservation program. This would enable borrowers to delay certain principal payments on outstanding REA loans to provide them with funds to lend to consumers for energy conservation-related improvements and modifications on existing residences and public buildings.

FEDERAL ASSISTANCE SOUGHT BY STATES

States were asked if they wanted some form of Federal assistance in electricity planning. The States' responses are summarized below.

Table 5
Does Your State Want Federal
Assistance in Electricity Planning?

	Number of States
Yes	17
Yes, but it depends on terms and conditions	7
No comment	9
No, not unsolicited	3
No	6
	42

Each State was asked to identify actions Federal agencies could take to help State regulators and private sector decisionmakers improve the quality of public and private sector electricity management planning. Suggested actions the Federal agencies could take in relation to State governments focused on money, technical assistance, and information services. Suggested areas for improvements in Federal programs concerned program management, policy formation, and intergovernmental coordination.

CHAPTER 6

CONCLUSIONS AND RECOMMENDATIONS

The quality of electric power planning and decision-making is of critical importance to the Federal Government, the States, and the consumers. Electricity planning--good or poor--ultimately determines the amount of electricity available to consumers and the rates consumers must pay for that electricity. Because utility investment decisions place heavy financial burdens on the ratepayers for extended periods, such decisions should be based on the best planning data available so that costly overbuilding or underbuilding do not result. Consumers have become increasingly aware that power supply decisions will impact for decades on the economic, environmental, and social costs they must bear. Federal officials are also coming to recognize that power planning decisions are critical to the timely achievement of the Nation's energy objectives.

CONCLUSIONS

Listed below are our conclusions based on our audit findings.

--Most State regulatory agencies are not well prepared to deal with the new challenges posed by power planning under changing conditions and there is no assurance when States will progress in developing their planning capabilities. States possess an uneven technical competence in electricity planning. In general, the States do not perform independent electricity demand forecasts and do not thoroughly evaluate forecasts prepared by their utilities. Further, the States are not moving to provide economic and regulatory incentives to encourage greater utility involvement in conservation and other alternatives. For the most part, neither States nor utilities (1) identify ranges of possible power demands or (2) thoroughly evaluate the potential of various alternatives to conventional generating facilities. In addition, some utility forecasting capabilities could be expanded to employ better available methods.

--DOE recognizes the existence of serious weaknesses in electricity planning but has been hesitant to act on the problems because it believes that (1) power planning is principally a State responsibility and (2) there is no clear mandate for Federal action in this area.

--Electric utilities, States, and Federal Government agencies should work together to improve electric power planning and decisionmaking. Timely Federal guidance is needed to meet identified planning needs at State, regional, and utility levels. An effective Federal program could provide the tools and resources needed to translate the national energy principles, particularly those encouraging conservation and the development of alternative energy resources into electric power planning at local levels. The utility industry should continue to have the primary responsibility for planning the Nation's electrical generating needs. However, the Federal Government should work to supplement and strengthen, not subordinate, the State's role in the review and approval of utilities' electricity plans.

--The Federal Government lacks a clearly defined program for doing its part to assure that States and utilities balance electric supply and demand in a manner consistent with other national energy objectives. While Federal agencies are sponsoring many projects which could impact on electricity planning, these projects are not designed to improve power planning and are not evaluated on that basis. A unified and better coordinated Federal effort is needed to guide utility planners, State regulators, and power consumers in improving their power planning practices.

--The Federal Government has a responsibility to ensure that national objectives are considered by States and utilities in developing plans for balancing electricity supply and demand. Such objectives should be consistent with national energy policies.

--Managers of the various Federal energy agencies must coordinate their efforts within a unified Federal electricity program to (1) enhance utilities' expertise in developing demand forecasts and State capabilities in evaluating such forecasts and (2) support State and regional assessments of generating and non-generating alternatives to balance supply and demand.

--Timely public participation in power planning is an important element in the development of acceptable electricity plans. State and local governments, environmentalists, utility customers, and other interested citizens should be afforded the front-end opportunity to participate in the development of plans. Where adequate public participation is precluded, or

significant shortfalls exist in local power planning practices, Federal intervention in State and regional hearings can be used to ensure the interests of power consumers are adequately protected, consistent with national energy policy.

--Prompt Federal and State action is needed to determine whether new economic and regulatory incentives should be used to motivate utilities to more aggressively pursue alternative methods of balancing power supply and demand.

RECOMMENDATIONS TO THE SECRETARY OF ENERGY

The Secretary of Energy has the authority under the DOE Organization Act to undertake a unified and coordinated electricity planning role focusing on improving State and utility planning practices. Therefore, we believe the Secretary should be taking actions to assure that the Nation's need for electric power is met at the lowest economic, environmental, and social cost, and in a manner consistent with national energy policies. Our recommendations listed below are intended to provide unified Federal oversight of electric power planning sufficient to (1) improve the quality and usefulness of electric power plans and planning practices within electric utilities and State regulatory agencies; (2) assure that the plans are consistent with national energy objectives; and (3) provide a more open and participative approach to electric power planning so that the economic, environmental, and social issues relating to power system development can be raised and dealt with in a constructive manner early in the planning process by all interested and impacted parties.

We recommend the Secretary of Energy:

--Establish the Economic Regulatory Administration as a responsibility center to coordinate all DOE efforts relating to improving electric power planning.

--Direct the Administrator of ERA to develop a unified program to improve electricity planning practices. Federal agencies with electricity responsibility (e.g., NRC, FERC, REA, and Federal power marketing agencies) as well as offices within DOE that can impact on electricity should be provided the opportunity to supply input to such a program. The program should not usurp State and utility planning responsibilities but focus on (1)

suggesting improvements in the quality of power plans developed by utilities and approved by State regulatory agencies so that power planning decisions are based on the best available analytical techniques, the most current and accurate data, and thorough consideration of the economic, environmental, and social issues; (2) evaluating the extent that State and regional policies for electricity are consistent with and supportive of the Nation's broader energy objectives and providing guidance when such actions are divergent; and (3) monitoring the effectiveness of such suggested changes. The program should address needed improvements in forecasting future electricity needs, assessing power supply/demand alternatives, and providing timely public participation in electricity planning. Before the program is finalized, States, utilities, and other interested parties should be afforded the opportunity to comment. In order to provide an effective out-reach program to the States and utilities, and in order to supplement oversight at the headquarters level, DOE should consider using its regional offices to carry out the electricity program.

--Undertake projects, whenever possible with the States and utilities, to identify at State and regional and Federal levels, the energy, regulatory, and economic policies which are currently shaping utility policies and determine what policy changes are needed to encourage electric utilities to respond with plans and actions to carry out national energy objectives. In addition, projects should identify and provide mechanisms for permitting public participation early in the utility planning process.

--Direct the Administrator of ERA to prepare a plan for regulatory interventions to be used whenever DOE's oversight of electricity planning at State and regional levels indicates that the interests of power consumers or the objectives of national energy policy are not adequately protected by the planning and evaluation techniques in use.

To assure that the guidance and oversight established by ERA provides prompt, continuing improvement in the quality of utility plans and State regulatory reviews, we recommend the plan include the following components:

--Developing, issuing, and updating of an electric power planning manual for use by State regulatory agencies, electric utilities, public interest groups, and Federal energy analysts. Such a manual

would focus on communicating the best available techniques for (1) integrating econometric and end-use forecasting models, (2) forecasting ranges of demand to reflect uncertain conditions, (3) making economic and environmental comparisons of all energy alternatives, and (4) providing timely public access to electric power planning and policymaking. For demand forecasting, the manual should identify the best available forecasting methods, the key assumptions and other factors which should be explicitly addressed, and types and sources of data needed to develop reliable forecasts. The manual should include information on the analytical methods and the sources of data and technical expertise that may be needed to compare the costs and benefits of competing generation and nongeneration alternatives.

--Identifying data bases and when necessary, disseminating demographic data and information on end-use patterns developed at the Federal level which can be used by State regulators and utilities to improve forecasts and analyses of alternatives.

--Issuing and disseminating, on a continuing basis, technical information bulletins for the use of planners and analysts within the electric utilities and State regulatory bodies. Such bulletins should provide the most current information available to DOE on the technical feasibility and the economic, environmental, and social costs of alternatives for balancing power supply and demand. These bulletins should describe in a timely, objective manner, important new developments in the United States and elsewhere on electricity planning.

DOE indicated it would need additional staff to implement our recommendations and authority to obtain needed data. DOE should review its current staffing situation to determine if it can reallocate staff to carry out the recommendations. If reallocation is not feasible and if DOE still believes it lacks sufficient (1) staff and (2) authority to obtain necessary data from States and/or utilities in a timely manner, we recommend that DOE seek such resources and authority from the Congress.

RECOMMENDATION TO THE NUCLEAR REGULATORY COMMISSION

We recommend that the Nuclear Regulatory Commission, before issuing both a construction permit and an operating license for a nuclear generating facility, review and use as

a guide the information developed by ERA's electricity program. NRC should periodically explain to ERA in writing its use of the information and ways, if any, in which the data could be made more useful to NRC.

RECOMMENDATION TO THE SECRETARY OF AGRICULTURE

We recommend the Secretary of Agriculture require the Administrator of the Rural Electrification Administration, before making financing decisions on electrical generating facilities, to review and use as a guide the information developed by ERA's electricity program. REA should periodically explain to ERA in writing its use of the information and ways, if any, in which the data could be made more useful to REA.

AGENCY COMMENTS AND OUR EVALUATION

Copies of the draft of this report were furnished to the Departments of Energy and Agriculture, Federal Energy Regulatory Commission, Nuclear Regulatory Commission, National Governors' Association, Edison Electric Institute, and the National Association of Regulatory Utility Commissioners for their comments. Written responses from the first six organizations are included in appendixes II to VII. Oral comments were provided by NARUC. In addition, we met with DOE officials to clarify some of their written comments. The report was revised in several sections to reflect the seven organizations' remarks. The following sections summarize the overall comments and present our views on these matters.

It appears from the comments received that several organizations misinterpreted our recommendations regarding the Federal role. The increased Federal role that we are recommending is one of oversight and support to help improve the quality of electricity planning and decisionmaking rather than a takeover or duplication of present State/utility planning functions. The Federal role we envision would not be designed to place a burden on States and utilities, but rather to provide a service to both entities.

Nuclear Regulatory Commission

NRC endorses our recommendation that the Secretary of Energy establish in the ERA a responsibility center to coordinate all DOE efforts relating to improving electricity power planning and to develop an electricity program. It further endorses the recommendation that NRC use the information developed by ERA and keep ERA informed of its need for analysis in this area. NRC believes the ERA program will be a major information source for NRC's assessment of power needs.

National Governors' Association

NGA agreed with our finding that few States have developed sufficient analytical capabilities to validate projections of electricity needs made by utilities, and added that States are attempting to solve this problem. However, NGA said that (1) States need Federal financial assistance, in addition to the recommended Federal technical assistance, in the areas of forecasting and analytical capabilities; (2) forecasting methodologies should fit State needs; and (3) the need for monitoring capabilities within DOE regional offices may be premature.

It is possible that Federal financial assistance to States could be needed to expedite improving States' electricity planning and decisionmaking capabilities and the quality of electricity plans. However, we believe that a decision on Federal financial assistance to States should not be made until the ERA has developed its unified electricity plan and States have had the opportunity to review it and determine if they can meet its objectives with their own resources.

We agree that the planning methods chosen by the States must fit their individual needs and situations. The planning methods should reflect the characteristics of the individual systems (e.g., diversity of load, geography, fuel mix, and financial, environmental, and regulatory climate). ERA's planning manual should provide the full range of forecasting methods available from which States can choose.

Regarding Federal monitoring, we believe it should be initiated early to assist States in determining what improvements are needed on a State, multi-State, and regional basis.

Department of Agriculture

The Department of Agriculture stated that the goal of our recommended action--that the Secretary of Energy take actions to assure that the Nation's need for electric power is met at the lowest economic, environmental and social cost, and in a manner consistent with national energy policies--is irrefutable.

In addition, Agriculture said that (1) planning for the Nation's electrical needs must significantly involve consumers, and Federal, State, and local governments; (2) forecasting techniques can be improved; (3) planning to match capacity and demand has become more difficult; and (4) the need for new conventional generating plants will decrease with the use of conservation and renewable resources. We agree with these points. However, Agriculture made some other points requiring further discussion: (1) the recommendation to inject a Federal presence is extremely controversial; (2) the Federal Government's direct involvement in

the decisionmaking process of when and how to build a plant would only lengthen the leadtime and exacerbate the problem, not solve it; (3) planning for the Nation's electrical needs should be conducted by an entity who will take responsibility for the end result; and (4) placing additional regulatory responsibility on utilities will only increase the possibility that capacity and demand will become more imbalanced.

Regarding the first three points, it appears that Agriculture misinterpreted our recommendations regarding the Federal role. The Federal Government has not, in the past, played a heavy mandatory role in electricity planning but has left this function to States and utilities. We are not recommending that the Federal Government become directly involved in the State/utility decisionmaking process of when and how to build generating facilities. Instead, we are recommending that the Federal role be one of oversight and support to help improve the quality of electricity planning and decisionmaking rather than a takeover or duplication of present State/utility responsibilities and decisions for items such as when and how to build.

Regarding the fourth point, we do not feel that the recommendations comtemplated in the report will place additional regulatory responsibilities on the utilities. Since our recommendations are directed toward improving electricity planning, they should not constitute an undue burden on those utilities which have done a thorough planning job of forecasting electricity demand and evaluating alternatives for balancing supply and demand. Without such planning there is little assurance that the Nation's future electricity needs will be met at the lowest economic, environmental, and social costs.

Department of Energy

DOE commended the report for its comprehensive examination of a complex subject area and offered comments which it believed would enhance the report's accuracy and usefulness.

DOE acknowledged that the utility industry should continue to have the primary responsibility for planning, developing, and operating the Nation's power system; the primary function of Federal and State agencies should be to monitor and motivate, not displace, the utilities' planning and design responsibilities. DOE points out that utilities should carefully consider and develop needed improvements in bulk supply system designs and operations, and regulatory agencies should assist the utility planning process to ensure consideration of all reasonable proposals and determine that those adopted are comprehensive and consistent with public interest. Our report does not disagree with these points.

We wish to expand on DOE's point on planning responsibilities. Our report is not intended to usurp responsibility from the utilities, but to provide a more active DOE role to work jointly with the States and utilities towards improving electricity planning and assure that the plans are consistent with national energy objectives.

DOE mentioned several areas requiring further attention: (1) legislative authority, (2) existing electricity programs, (3) staffing requirements, (4) obtaining accessability to utility data, and (5) obtaining more State and utility input to the report.

Regarding the first area, DOE commented that our recommendations would require a significant expansion of DOE involvement in the utility area for which DOE believes it does not have the necessary legislative authority. DOE cites that this issue is relevant since utilities have historically resisted Federal intervention particularly in the area of system planning and forecasting. In its written comments, DOE stated it lacked "the necessary legislative authority to carry out the comprehensive electric utility system planning initiatives contemplated by the report." However, at a meeting with DOE to clarify DOE written comments, DOE stated it had misinterpreted our recommendations. DOE thought we were recommending a much stronger and broader Federal role than that of suggesting improvements and working with States and utilities to assist them in performing their planning duties. Subsequenily, DOE said it did have the broad authority to carry out the recommendations.

Regarding the second area, DOE points out it is currently performing, at least in part, many of the actions recommended for improving utility planning including (1) promoting improved industry planning procedures through the National Electric Reliability Councils as well as through technical assistance to States and utilities and (2) developing national and regional projections of electric energy consumption, peak loads, installed generating capacity and fuel consumption based on data and plans submitted by utilities, regulatory reliability councils, and State agencies. DOE said it also provides an independent assessment of utility forecasts.

We recognize that DOE has been performing, at least in part, many actions and programs that can improve State and utility planning but lacks a central program to coordinate these actions within an electricity planning framework. DOE's activities are geared towards assuring the reliability of bulk power supply and not directly aimed towards improving electricity planning. Our audit work identified that DOE staff is already involved in several programs (some of which

are enumerated by DOE in appendix V) and models which would assist in achieving our recommendations. Part of our concern is that these programs be pulled together into a central program within ERA to show their impact on electricity and used in a coordinated and unified electricity plan.

Regarding the third and fourth points, DOE believes that implementing our recommendations would require a significant increase of headquarters and regional staff. In addition, DOE felt that the report should more fully explore alternative ways of achieving the needed level of industry cooperation in data gathering and analytical capabilities; industry has been reluctant to provide Federal agencies with the type of data that would support a Federal analytical and planning effort.

Our report does not specifically address staffing needs nor access to utility data. We cannot say with certainty what the DOE staffing needs would be or how the accessibility to utility data would impact DOE's role. We believe DOE should review its staffing situation and reallocate staff where possible in order to develop and implement the electricity planning program. DOE should also consider how existing programs and offices which affect electricity can be used in a unified and coordinated electricity plan. Regarding the issue of data, according to DOE, it has the authority to request, but not compel submission of data from utilities. We believe DOE should try to obtain utility data using this authority. If staffing or accessability to data remain relevant issues, DOE should seek such resources and authority from the Congress to remedy these problems. We plan to remain active in evaluating DOE's progress in these two areas of staffing and data.

On the final issue, DOE believes more extensive utility and State input should be solicited on the draft report and incorporated into the final report. Because of our need to obtain an overall utility industry perspective, we obtained comments from EEI which acts as a representative for investor-owned electric utility companies which generate 78 percent of the electricity in the United States. In addition, NGA and NARUC comments were solicited to provide a State perspective. NGA maintains contact and coordination with States and, according to NGA, it is the instrument through which States can collectively influence the development and implementation of national policy. NARUC is a professional organization of State and Federal regulatory commissioners having jurisdiction over transportation companies and public utilities, including electric utilities. NARUC's membership includes governmental agencies of the 50 States and the District of Columbia. NARUC's objective is to improve the quality and effectiveness of public regulation in America. We believe this coverage was adequate.

Edison Electric Institute

EEI raised a general concern that our recommendations would create extensive Federal involvement in utility planning. EEI cited that such a Federal role would place a significant and unnecessary burden on utilities which, according to EEI, already recognize the need for prudent electricity planning and have pioneered work in this area. EEI contends that utilities have extensive experience with planning and forecasting and have developed a very high level of expertise. According to EEI, the problem is not that utilities and States lack the best techniques for forecasting but rather the report fails to deal with the real challenge of handling uncertainty created by Federal indecision and policy reversals. It adds that utilities have taken the lead in developing techniques to deal with Federal uncertainty.

The increased Federal role that we recommend is one of oversight and support to help improve the quality of electricity planning and decisionmaking rather than a takeover or duplication of present State/utility planning functions. The Federal role we envision would not be designed to place a burden on utilities, but rather to provide a service to both States and utilities. Some utilities are already performing well in the electricity planning area. To the extent that adequate electricity planning has been performed (i.e., forecasts prepared using best methods with good data bases and all alternatives thoroughly evaluated), the proposed Federal actions would impose no burden on utilities. In fact, good plans and timely public involvement could do much to ease the delays and regulatory burden troubling utilities.

While we agree that utilities and States have extensive electricity planning experience, little of this experience has been focused on meeting the challenges facing the power planner in "today's" environment. We do not agree with EEI that the real problem is not that States and utilities lack the best forecasting techniques. Our review indicates (1) there are ample opportunities to improve the quality and usefulness of demand forecasts and analyses of alternatives to conventional generating facilities and (2) very slow progress is being made to incorporate conservation, load management, and renewable energy alternatives into State/utility plans for balancing power supply and demand. We agree that forecasting in the face of uncertainty or changing conditions--whether it be supply interruptions, Federal policy changes affecting oil usage by utilities, or conservation initiatives--is at best difficult. However, improved forecasting assumptions and methodologies, if not incorporated in planning practices, will only decrease credibility.

Federal Energy Regulatory Commission

FERC agrees with the report's recommendation that to the degree DOE's comprehensive electricity program could encourage more effective regional power planning, it could be helpful. Further, FERC points out that the report presents a reasonably balanced discussion of the strengths and weaknesses of various forecasting techniques. FERC added that a Federal power plan should not be the basis for approving new construction; this would place the responsibility for the adequacy of power supply with the Federal Government. However, FERC's overall comments indicate in our view that FERC does not place much importance on forecasting as a component in the planning process. FERC's main concern is the uncertainty in scheduling of plants to meet demand. FERC regards overbuilding of units as good, because it is easier to slow down construction of a unit rather than to speed it up. Overbuilding is also beneficial because it may result in the transfer of excess capacity in one system to meet deficits in another system that may have occurred from unanticipated events such as Three Mile Island. FERC regards poor forecasting and overbuilding as "no cost" alternatives to the ratepayer.

We agree with FERC that the role outlined for DOE should not usurp the traditional utility and State functions of planning to fulfill the Nation's electrical needs. We are not recommending that a Federal power plan be the basis for approving new construction, rather the Federal role should seek to improve and assist State and utility capabilities in their decisionmaking responsibilities.

FERC appears to neglect a major step in the planning process, that of reviewing all generating and nongenerating options to meet demand. We feel electricity planning is a much broader matter than merely scheduling the type of construction. Planning also involves the thorough analyses of all available options to satisfy demand (e.g., conservation and renewable energy resources) and selecting and implementing the least cost alternatives.

We did not specifically address in our report the cost implications of overbuilding. However, we believe that avoidable forecasting errors do result in significant cost additions to ratepayers and disagree with FERC on this point. Electricity plans, an outcome of forecasting demand and analyzing options, continue for the most part, to focus only on constructing conventional generating facilities to meet demand, and ignore many nongenerating options (e.g., conservation and solar) which may be far more cost-effective. Construction of the more costly conventional plants requires the consumer to pay the incremental cost of that plant over a less costly option, and carry that cost over each year

of the plant's life. Other costs can arise when a new plant, because of overforecasting demand, is not fully needed when completed and results in idle capacity of the new or an older plant in the system, or the premature retirement of a plant in the system.

We recognize that forecasting is difficult because of its uncertainties. While any forecast may not be totally accurate, it represents the best estimate of demand growth. Therefore, we feel a range of forecasts based on differing variables could provide better insight into electricity planning (see page 18). We also believe that construction schedules can be altered, and are, but the fact is that the initial decision to make an investment in a plant is based on a forecast. If this forecast is not prepared using the best methodology and data in the system, the risk of error can increase. This can result in unnecessary planning, design and construction costs being passed on to the consumers. It further commits a utility to a decision or path that might not have been followed if the decision was made a year or two later. These planning decisions, while made within the context of supplying adequate and reliable power, must also be provided at the least environmental, social, and economic cost to the consumer.

FERC points out that they do not consider conservation and load management as options before issuing hydroelectric licenses because utilities have little ability to bring about these alternatives with predictable results. The report acknowledges current regulatory constraints have limited the utilities' pursuit of these alternatives as a potential to displace generating capacity (see page 33) but in some cases these options are being considered and included in plans. For example, the New England Electric System is projecting a 1.9-percent electrical growth rate, down from 3.1-percent, after considering load management. Also, utilities in California conclude that nonprice conservation measures will save 10 to 12 percent of electricity sales by 2000. California's Energy Commission staff forecasts a 14.6-percent statewide savings from conservation measures already in place (see page 33). Detroit Edison has had a load management program in place since 1968 which averted the need for new peaking facilities and saved about $1.7 million in 1977 (see page 28).

National Association of
Regulatory Utility Commissioners

NARUC supports improved Federal/State cooperation and interprets the report as not calling for further Federal intrusion in the State regulatory process.

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CONSULTANT'S REPORT

ON

STATE AND UTILITY

PLANNING PRACTICES

BY
JOHN B. NOBLE 1/

The views and conclusions contained in this document are those of the author and should not be interpreted as necessarily representing the official policies of the United States General Accounting Office or the United States Government.

1/John B. Noble, attorney, has worked on electrical energy problems with decisionmakers at local, State, and Federal Government levels. His principal published works touching on the subject of electric power planning are: "Need for Power: Determinants in the State Decision Making Process" and "Environmental Planning and the Siting of Nuclear Facilities: The Integration of Water, Air, Coastal, and Comprehensive Planning into the Nuclear Facility Siting Process," both prepared for the U.S. Nuclear Regulatory Commission.

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INTRODUCTORY REMARKS

This study was commissioned by the U.S. General Accounting Office to determine the status of State oversight of electric utility planning and management. An understanding of State responsibilities, perceived problems, opportunities and trends, and State views on the appropriate role of the Federal Government is essential to an analysis of the existing Federal policies and programs.

The findings and conclusions of this study shed light on the States' perception of electricity planning by utilities and the extent to which the States believe satisfactory progress is, or is not, being made towards National goals for electricity in the future. This study identifies problems associated with, and opportunities for, improved cost-effective planning and management.

GENERAL CONCLUSIONS

Substantial overlaps, gaps, or conflicts in regulatory structures and policies for evaluating power system planning exist in most States. However, there does not appear, with a few exceptions, to be a clear institutional or policy problem common among them.

Each State has evolved distinct policies, programs, and institutional arrangements for meeting its responsibilities regarding the oversight of public and private sector electric power system planning. However, few States purport to evaluate electric power supply and demand on a statewide basis or have the data and information base to perform a reasonable evaluation. Moreover, while practically all States purport to place responsibility for meeting duties associated with the evaluation of investor-owned electric power systems somewhere in State government, approximately one-half of the State governments do not perceive themselves responsible for evaluating publicly-owned utilities' planning activities. And few States have reasonably specific knowledge of electric generation or usage that occurs outside the electric utilities' system, for example industrial or commercial self-generation.

While each State is unique in the placement of responsibilities regarding the evaluation of power system planning for investor-owned utilities, the following table illustrates the role State agencies have in meeting each identified responsibility, including instances where no State agency is responsible for a particular duty.

Table 1

Placement of State Responsibility
Evaluation of Investor-owned
Utilities Power System Planning
(40 States responding to survey question)

Electricity planning responsibility	Traditional PSC alone	Shared between traditional PSC and another State agency	Other State agency responsible	No State agency responsible
-assuring adequate public or legislative participation in power system planning and policy-making.	7	14	5	14
-assuring that the potentials of renewable energy sources are developed.	10	6	19	5
-assuring that electricity demand forecasts are accurate and realistic.	24	8	4	4
-assuring that cost-effective conservation programs and projects are implemented.	13	12	12	3
-assuring that the costs and the benefits of alternative methods of meeting future power needs are carefully evaluated and compared before capital investment (rate base) decisions are made.	29	7	2	2

Table 1
(continued)

Electricity planning responsibility	Traditional PSC alone	Shared between traditional PSC and another State agency	Other State agency responsible	No State agency responsible
-exercising controls to minimize the impacts (including cost) of constructing powerplants and transmission/distribution facilities.	20	14	5	1
-assuring the reliability of power supplies for residential, commercial, and industrial customers.	27	7	5	1
-assuring that power rates charged industrial, commercial, and residential customers are equitable, encourage conservation and discourage waste, and include the appropriate costs of service.	39	0	1	0
-assuring that new powerplants and transmission facilities do not violate State and Federal environmental standards.	5	10	25	0

While each State has given some State agency, or combination of State agencies, the responsibility for evaluating investor-owned power system planning, this does not in itself ensure that effective coordination of power supply planning among State agencies or among individual utilities will occur. In fact, most States have either informal or no mechanism for coordinating decisionmaking authorities and actions relating to power supply planning. And relatively few States clearly integrate other State goals and policies into their decisionmaking process affecting the future balance of electric power supply and demand.

Utilities are planning to rely on conventional powerplants, as opposed to other electricity management options, to meet practically all of the anticipated load growth through 2000.

Comparatively few States are aware of how the utilities in their States plan to balance supply and demand in even the near future--1990 and 2000. The year 1990 is currently within most utilities' supply planning horizon because of the 10- to 15-year leadtimes between the decision to build a large conventional coal or nuclear powerplant, and its eventual completion. Consequently, planning horizons currently used by most States do not encourage an in-depth examination of alternatives to conventional powerplants in balancing future supply and demand.

Utilities and the States are not, in general, placing much reliance on the role of conservation or other non-conventional options to help balance demand and supply between now and the year 2000.

Electric utilties use a variety of forecasting techniques--from the relatively simple to the extremely complex--to predict future demand for electric power. These techniques have not adequately reflected, in general, a number of State and Federal policies and goals, including energy conservation, which affect or which are affected by the future balance of demand for and supply of electric power. Substantial opportunities exist for improving the accuracy and reliability of demand forecasts prepared by utilities.

The capability to reasonably predict future demand for electricity, and the balancing of demand and supply, is critical to sound decisions on the proper mix of conventional and non-conventional options to efficiently meet future loads. To date, utilities have used a variety of techniques to achieve this goal. However, it is clear that these

forecasting techniques, as used by the utilities, leave substantial room for technical improvement. And use of these tools by utility management has even more room for improvement. For example, the forecasting techniques and the assumptions explicit or implicit within them, often bury, if not ignore, significant factors that affect future demand, such as conservation and the effect of changes in the price of electricity.

Most States purport to use independent forecasts or other means to scrutinize and test the reasonableness of utility forecasts. The effectiveness of the States' evaluation efforts are, in general, questionable. For example, few States provide a comprehensive overview of overall utility planning in their State, carefully examine the assumptions contained within utility forecasts, or integrate electric power planning with other State energy, environmental, economic and social programs, goals, and policies.

Most States purport to evaluate utility forecasts by validating key assumptions and demographic/economic data. However, most States do not appear to critically examine several significant aspects of electricity planning, such as the effect of price on consumers' consumption. While a number of States use independent forecasts (17 of the 41 responding States) in the evaluation process, relatively few States develop forecasting methodologies or guidelines for electric utilities to use in developing their forecasts.

Approximately three-fourths of the responding States do not have utilities submit a range of forecasts for public review, so that power supply plans could be more easily evaluated over a range of possible future situations. Moreover, most States believe they are not adequately staffed and funded to meet their responsibilities for evaluating utility planning practices, including forecasting.

Utilities have forecast, and continue to forecast, higher demand than has occurred or that the States' independent forecasts or analyses predict.

State regulatory agencies have done little to ensure that non-conventional alternatives, such as conservation, rate reform, cogeneration, are thoroughly studied and implemented where cost-effective.

For investor-owned utilities, each State asserted that some agency(s) has the responsibility to assure that the

costs and benefits of alternative methods of meeting future power needs are carefuly evaluated and compared before capital investment decisions are made. While a few States have studied the potentials of alternatives to building conventional powerplants, most States have not studied such alternatives. Though most States purport to have the authority to require utilities to study and to implement cost effective projects or practices, few have exercised this authority in the last 3 years. However, more than one-half of the States do not believe satisfactory progress is being made by the utilities in addressing the potential opportunities of the alternatives to traditional means of balancing electric demand and supply.

In general, State regulatory practices and procedures do not encourage active public involvement in electric power system planning and policymaking. Moreoever, these practices and procedures do not foster consideration of other established State goals and policies in longer-range electric system planning.

More than one-half of the States purport to have established communication forums to encourage citizen involvement in planning the State's electrical energy future. And practically all the States allow an opportunity for citizen participation, formal or informal, in individual rate hearings or powerplant siting hearings. In general, however, the scope of these hearings is quite narrow, and they tend to be adversarial in nature. In short, the hearings are designed to address specific utility proposals, such as a rate increase or specific powerplant approval, and they are not designed to, or managed in a manner to, encourage public involvement in longer-range energy planning. Generic or legislative-type hearings are being used more often by the States, but the results of these hearings are rarely disseminated to the public in a manner that fosters more knowledgeable public involvement in rate hearings, site hearings, or other electric power planning activities.

State agencies have made little use of incentives to encourage utility and regulatory interest in exploring the full range of electricity management options.

The majority of the States do not consider that their utilities are making satisfactory progress in addressing non-conventional alternatives. Yet, relatively few States have studied the potential for non-conventional supply options or demand-modifying techniques or required the utilities to do so. Further, the majority of the States do not use financial

or other incentives or sanctions to encourage utilities to explore conservation, load management, cogeneration, or renewable energy projects. Few States perceive their role as requiring them to carefully scrutinize how well utilities balance supply and demand at the lowest economic, environmental, and social cost. In short, the States have generally not viewed the traditional rate approval and plant siting processes as tools for encouraging utilities to thoroughly examine and implement non-conventional alternatives. The State governments, as assisted by the Federal Government, are not meeting, in general their current needs and requirements regarding oversight of electric utilities.

In general, State regulatory agencies believe they are not adequately funded or staffed to meet their present responsibilities for evaluating utility planning practices. The Federal Government is not currently perceived as providing substantial assistance to the States in addressing their evaluation problems. However, there is relatively little consensus among the States on either needed improvements in existing Federal programs or on the appropriate role of the Federal Government in fostering improved electric utility regulation.

FACTUAL SUMMARY

A. How are electric utilties planning to balance power supply and demand between 1978 and 2000?

A.1. What was the electricity consumption in each State by major consumer class and what percentage of electricity load did the major types of utilities provide?

Each State was asked to identify the megawatt hours of electricity consumed in the State in 1978, or in the latest 12-month reporting period, by major customer groups (industrial, residential, commercial). In addition, the States were asked to include system (utilities) and off-system (e.g., self-generation) figures, i.e., total electricity consumption in the State. While the question was designed to be answered in numerical terms, the limited number of States providing such data does not support its direct usage in a quantitative manner. The fact that less than one-half of the States even had this information available provides an insight into the current lack of comprehensive data bases and information management systems at the State level.

Eighteen States provided data on the 1978 consumption of electricity by customer classes. And, an additional 10 States provided annual data but not for 1978. These data were generally restricted to investor-owned utility system usage, and it did not include off-system production and consumption. Nine States provided data for only certain utilities but did not summarize data for the State as a whole. Five States stated that data were not readily available. A total of nine States did not respond to the questionnaire or left this particular question blank.

Each State was asked to identify the principal suppliers of electricity to the State, and the percentage of the State's retail load they met. The types of principal suppliers were identified as investor-owned utilities (IOU); publicly owned utilities (POU); Federal agencies; and others (self-generation).

Twenty-eight States identified the approximate percentage of electricity supplied by the utilities serving the State. Seven States stated that this data were not available or they left the question blank, and eight States did not respond to this question. Eight States provided a partial answer to the question. These data were limited to a few suppliers of electricity or was incomplete in the description of the percentage attributable to each group.

A.2. How are utilities planning to meet demand loads in 1980, 1990, and 2000?

Based on its knowledge of current plans of the utilities providing electricity in and to the State, each State was asked to estimate how demand loads will be met in 1980, 1990, and 2000. Several distinct supply and demand-modifying alternatives were identified for use by the State in making these estimates, as described below.

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Table 1
Techniques for Meeting
Utility Forecast Loads

(in percentage)	1980 Peak	1980 Average energy	1990 Peak	1990 Average energy	2000 Peak	2000 Average energy
A. Conventional powerplants (coal, nuclear, conventional hydro, and gas or oil fired)	___	___	___	___	___	___
B. Cogeneration projects	___	___	___	___	___	___
C. Non-conventional generation and displacement (low-head hydro, biomass, geothermal, wind, solar, etc.)	___	___	___	___	___	___
D. Exchanges and purchase agreements with other utilities	___	___	___	___	___	___
E. Electricity conservation programs (eliminating waste)	___	___	___	___	___	___
F. Load management techniques and rate reforms	___	___	___	___	___	___
G. Other sources	___	___	___	___	___	___
	100	100	100	100	100	100

Based on their responses, few States are aware of how the utilities are specifically planning to balance supply and demand over the next 20 years. For those States that provided data, alternatives to conventional powerplants are expected to meet a relatively small proportion of future loads. Only two of the responding States expect conservation, non-conventional sources, load management, and cogeneration to meet more than 10 percent of the loads through the year 2000. Only 6 States gave a reasonably complete answer to the question, while 11 States provided partial data--for some years (5), some utilities (2), or both (4). Seventeen States indicated that the data were not available and nine States did not respond to this question. Eight States did not respond to the survey.

Those States that asserted the data were not available (17) were asked their judgment ("ball park figures") on the mix of supply and demand-modifying options likely to be in effect by 1990 and 2000. Eight of these States indicated that conventional supply options would be used to meet practically all (99-percent plus) future loads. Seven States had no opinion. Two States indicated that "conservation" would have a minimal effect, but it was viewed as a demand-modifying measure not a supply option. This latter fact highlights the differing views of conservation. Some view conservation as a supply option, in which case it would tend to be expressed in clearer quantitative terms, and subject to more precise public debate. Some view conservation as a demand reduction measure, in which case the impact tends to be buried in forecasting models, remains "fuzzy," and deemphasizes the importance of conservation.

Nine out of every 10 States believe that utilities are planning to rely on conventional powerplants to meet practically all of the future loads (98-percent plus). While conservation was given a minor role to play, it appears that most of those States that attempted to quantify its impact tend to view it as a demand modifier not a supply option.

It should be noted that where States performed independent forecasts or analyses of utilities' forecasts their expectations for conservation (price and non-price related) and other non-conventional alternatives resulted in significantly lower forecasted loads. (See B. 3, p. 78).

B. What forecasting techniques and State evaluation methods are reflected in State/utility electricity planning to balance demand and supply?

B.1. What are the principal demand forecasting techniques used by the electric utilities?

Forty-one States responded to the above question. Forecasting techniques were categorized as follows: 1/

A. Qualitative techniques (use expert opinion; may not use historical data) e.g., Delphi method.

B. Time-series analysis and projection methods (use statistical methods to make qualitative forecasts based on patterns or changes in patterns measured in historical data) e.g., trend projections.

C. Causal methods (obtaining information, particularly relationships among system elements; relies on historical data) e.g., econometric models, end-use models.

The response of the States indicates a wide range of forecasting techniques in use. The following table displays the States' response.

1/Based on A. Gandara, Electric Utility Decisionmaking and The Nuclear Option, for the National Science Foundation R-2148.NSF, June 1977.

APPENDIX I

Table 2
Forecasting Techniques
Used by Utilities

	Qualitative techniques	Time series	Causal techniques
Utilities do not use	20	2	2
Use in combination with other techniques	3	2	0
Some utilities use	11	18	18
Small	3	8	0
Large	0	0	6
Unclear	8	10	12
	11	18	18
Most utilities use	6	18	19
Small	0	2	0
Large	0	4	9
Unclear	6	12	10
	6	18	19
Unknown	1	1	2
Total	41	41	41

As would be expected, the relative size of a utility, the expertise available to it, and the degree of concern by the public and their representatives have a significant effect on the choice of forecasting techniques.

B.2. How are the utilities' forecasts validated and by whom?

Each State was asked to identify the evaluation techniques used, if any, by the State. Three categories or types of evaluation approaches were presented in the questionnaire as follows

--prepare independent forecast (or contract for same),

--analyze and evaluate utilities' forecast by validating the key assumptions and demographic/economic data, and

--develop forecasting methodologies or guidelines for electric utilities to use in developing their forecasts.

Most States purport 1/ to evaluate utility forecasts by validating the key assumptions and demographic/economic data (32 of the 41 responding States). 2/ While several States purport to use an independent forecast (17 of the 41 responding States) in the evaluation process, 3/ relatively few States develop forecasting methodolgies or guidelines for electric utilities to use in developing their forecasts (6 of the 41 responding States). It should be noted that 18 States use more than one evaluation technique.

1/The author did not attempt to confirm the extent to which State forecasts were in fact "independent" or how the evaluations were actually used in the decision making process.

2/While these States purport to validate key assumptions and demographic/economic data, the States' responses to other questions raise substantial doubts about what are key assumptions, etc., and the States' standards for adequate validation.

3/See, B. (4). "How do State forecasts compare to the utilities and what accounts for the differences?"

Because the price of electricity, the price of its substitutes, and non-price conservation affect future demand for electricity, these factors should be clearly identified in and accounted for in a utility's forecasts (and supporting models). Each State was asked whether or not the utilities' forecasts contain explicit assumptions about how demand for electricity would be affected by substitute energy sources, by price variation, and by conservation programs. The States' responses to each of these factors is summarized below.

Table 3
Explicit Assumptions in Utilities Forecast

	No	Yes	Some utilities	Do not know	Total
Price of substitute energy sources	16	16	8	1	41
Price of electricity	17	14	9	1	41
Conservation programs	15	15	8	3	41

In view of the uncertainties in demand forecasts, it would seem appropriate for electric utilities to develop a range of forecast (e.g., high, most likely, and low) so that plans to balance supply and demand could be evaluated over a range of possible situations. Each State was asked whether regulated utilities prepare forecasts in this manner and submit them to the State. Approximately one-fourth of the States responding to this question (10 of 42) had utilities submit a range of forecasts for public and staff review in the formal decisionmaking context. The reasons assigned for not requiring or encouraging utilities to submit an array of forecasts were:

Table 4
Reasons for Not Requiring/Encouraging
Utilities to Develop and Submit
A Range of Forecasts

No specific reason	14
Debate issues in formal hearings	5
Technical flaws in methods result in lack of confidence in forecast	4
No value because frequently update forecast	3
Only causes confusion	3
State develops its own forecast	2
Limited technical expertise/ resources of State to review	1
	32

It should be noted that only two States explicitly stated that the existence of an independent forecast was the reason for not encouraging or requiring utilities to prepare and submit a range of forecasts. Yet, 17 States stated they prepared (or contracted for) an independent forecast, and that it is used to evaluate utilities' forecasts. A total of 23 States indicated that either the State or another organization had prepared forecasts for use in State proceedings.

At the least, these responses indicate a general lack of concern by the responsible State agency for, or confidence in, the development of a range of forecasts by the utilities (see also E. p. 109). This is the case even though the utilities are generally familiar with the problems of demand forecasting and therefore are arguably in the best position to bring forward the data and information necessary for a proper examination of alternatives for balancing supply and demand over a range of possible future situations.

Moreover, the public has difficulty in providing informed opinions and timely input into the decisionmaking process when the effect of data limitations and methodological assumptions in utilities' forecasts are not clearly stated and the implications clearly identified. With the

admittedly limited staff and resources available to State agencies to assist in this type of critical evaluation (see E. p. 109), this lack of understanding also can contribute to an unnecessary degree of conflict and a lack of confidence in the objectivity of the electricity planning process.

B. 3. How do recent utility forecasts compare to actual loads that occurred and what accounts for the differences?

Load forecasts are one of the primary bases upon which investment decisions are made. The accuracy of the forecasts is therefore an important factor in determining how well the utilities and the State are balancing the costs and benefits of demand/supply alternatives and uncertainties. Each State was asked to provide numerical data on how the utility forecast (peakload and average energy load) as of January, 1975, compared to the actual loads that occurred for 1976, 1977, and 1978.

Only four States provided a full answer to this question. Twenty States either left this question blank or stated that this data were not readily available. Eight States did not respond to the survey. Consequently, it can be reasonably assumed that most States do not place much importance on comparing utility forecasts with actual usage of electricity.

Approximately one-fourth of the States provided data for some years, for some utilities, or for both, in response to this question. In nine of these States (and perhaps, based on inference, an additional five States) utility forecasts were adjusted annually. In these States data comparing annual forecasts with actual consumption were provided. Seven States provided data only for certain utilities and for certain years. Eight States provided data for all years but only for certain utilities. Two States provided data for all utilities but only for certain years.

Based on those States providing full or partial data on forecasts and actual electricity consumption, it is clear that practically all utilities forecast higher usage than actually occurred. Even where utility forecasts were adjusted annually, practically no utility has forecast lower consumption than actually occurred.

The reasons offered by the States to explain the disparities between utilities' forecasts and actual consumption tended to overlap or to be attributed to more than one cause.

Conservation was most often mentioned by the States (15 States) followed by erroneous growth assumptions (11), weather (7), economic growth (3), price (3), and the 1973 oil embargo and the 1978 coal strike (2 each).

B. 4. How do State forecasts compare to the utilities' and what accounts for the differences?

Each State was asked how the State's forecast or analysis, if any, compares to the utilities' forecast for the next 10- and 20-year periods. In addition, each State was asked to identify the reasons for the variation, if any, in terms of different assumptions or different methodologies.

While less than one-half of the States indicated they prepare a forecast or analysis (19 of 41), most States that did so for the next 10-year period had results significantly lower (in their opinion) than the utilities (14 States). In only 2 States were the results deemed close in the comparison and three States indicated they had no opinion as to the significance of the differences. 1/ Based on the States' responses, in no instance was the State's demand forecast higher than the utilities' forecast. The major assumptions identified as causing the different forecast results were (with some overlaps): population growth (11); economic growth (8); impact of the price of electricity on demand (6); impact of conservation (4); and estimates of personal income (3). Ten States attributed a portion of the variation to the use of different methodologies.

Twenty-year comparisons were relatively rare. However, in 6 of the 7 States that had comparative forecasts or analyses, the States' projections were, in their opinion, significantly lower than the utilities' forecasts. Thirty-four of the 41 responding States did not have comparative forecasts or analyses for a 20-year planning horizon.

The cost, in terms of premature commitment of capital and lost opportunities, such as technological advances, from erroneous load forecasts would seem to warrant more critical review of utilities demand forecasts, at least over a 10- and 20-year period given the results from those States that have performed comparative forecasts and analyses.

1/Two of the three States with "no opinion" apparently had no independent forecast or quantitative analysis to use for comparison with utility forecasts. (See B. 2., p. 75.)

APPENDIX I

B. 5. Are State plans, goals, or policies that affect future demand addressed in the utilities' forecast?

Each State was asked how the goals and programs of other State agencies (those without a primary electricity management responsibility) are considered in utility power supply plans and planning practices for several subject areas--economic development, land use, environmental quality, and consumer protection. Forty-one States responded to this question. To clarify the responses to this question, it is necessary to consider the States' responses to other inquiries, particularly regarding the understanding of how and by whom assumptions regarding State goals and policies are set in forecasting. Moreover, the States were asked how State goals or plans in several subject areas are incorporated into the assumptions used for electric demand forecasts upon which State rate approval is based. The response to these questions, when read together, presents a rather bleak picture of the States' fundamental understanding of integrated energy planning and established national and State energy, environmental, and social policy.

For the 41 States responding to the first question, the techniques relied upon most often to foster consideration of State plans and programs for economic development, land use, environmental quality, and consumer protection were participation in administrative hearings or submission of formal comments on utility plans or proposed projects. As displayed in table 5, the large number of States that do not formally address other State goals and programs, as opposed to standards, in electricity planning is somewhat suprising. This is so because many of these standards are transitory in nature. In short, they are established as means to achieve legislative policies over time and are not ends in themselves.

Table 5
How State Goals And Programs Are Considered in Electricity Decisions

	Economic Development	Land use	Environmental quality	Consumer protection
Formal participation or comments in administrative decisionmaking process	16	17	19	21
Viewed as a constraint	0	3	12	0
Informal	4	2	1	2
No indication how impact is addressed	5	3	3	6
Rely on utility	2	1	1	1
Incorporated in load forecast model	2	1	1	1
No State plan or goal	7	12	3	7
Do not know	5	2	1	3
	41	41	41	41

In addition to the above inquiry, which focused on how other State agencies' goals and programs are considered in electricity planning, each State was asked whether State plans or goals were incorporated into the assumptions used for electricity demand forecasts upon which rate approval is based. To assist the State in responding to this question several specific topics were identified: economic development, land use, energy conservation, and environmental quality (air, water, coastal zone, and housing).

Forty-two States responded to this question as displayed in table 6.

Table 6
State Plans Or Goals Incorporated in Forecast Used in Rate Approval Process

State plan or goal	Yes	No	Total
Economic development	14	28	42
Land use	9	33	42
Energy conservation	21	21	42
Environmental quality			
Air	20	22	42
Water	20	22	42
Coastal zone	9	33	42
Housing	16	26	42

While approximately one-half of the responding States indicated that energy conservation and certain environmental goals or plans were incorporated into the assumptions used in demand forecasting, few States said that other plans or goals, such as housing, economic development, and land use were so incorporated. This is perhaps the opposite to what would be expected, given the traditional concerns of State public service commissions in reaching rate decisions. However, it is also reasonable to conclude, as pointed out by several States, that economic development and housing concerns present significant factual questions that are debated in hearings even though these State plans or goals are not explicitly incorporated as assumptions in demand forecast.

C. What actions have the States taken to ensure that alternatives to conventional generating facilities such as conservation and cogeneration are thoroughly studied and, where cost-effective, implemented before conventional powerplants are approved for construction?

1. Have studies been conducted and potentials been identified?

Each State was asked a series of questions regarding alternatives to conventional powerplants for balancing electricity supply and demand.

These questions were:

A. Have any studies of the statewide potential been made?

B. Who sponsored the studies (State, Federal, utilities, other)?

C. How significant are the identified potentials through the year 2000 in megawatts?

D. What actions have been taken to assure that the potentials identified in the studies have been factored into power supply planning?

E. Has any significant energy potential not been realized or addressed because of constraints (real or perceived) by Federal or State policy, law, or regulation?

Only the States' responses to questions A and C are summarized below primarily because all States that did not have statewide studies stopped at questions A with a negative response, and most States furnished little useful information in response to questions B, D, and E.

The States were asked to respond to the following alternatives for each of the above questions.

Alternative

A. Production improvements

1. Raising dams

2. Adding generators to existing powerplants or dams and waterways

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	Alternatives could make significant contributions	26	1/C13
	Conservation	26	1/C13
	Load management	27	1/C14
	Cogeneration	29	1/D2
	Renewable resources and other alternatives	30	1/D3
	States are slow to address alternatives	31	1/D4
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ABBREVIATIONS

DOE	Department of Energy
EEI	Edison Electric Institute
ERA	Economic Regulatory Administration
FERC	Federal Energy Regulatory Commission
GAO	General Accounting Office
MW	megawatts
NARUC	National Association of Regulatory Utility Commissioners
NGA	National Governors' Association
NRC	Nuclear Regulatory Commission
REA	Rural Electrification Administration

3. Installing more efficient generators/transformers
4. Reducing transmission and distribution losses
5. Other

B. Grid developments

1. Interties
2. Pooling
3. Exchange agreements
4. Other

C. Conservation initiatives

1. Information programs
2. Loan programs
3. Pricing changes
4. Energy audits
5. Other

D. Pricing and rate structures

1. Seasonal pricing
2. Time-of-day pricing
3. Elimination of declining block rates
4. Inverted rate structures
5. Replacement cost pricing
6. Other

E. Load control devices

F. Cogeneration projects

1. With industry
2. With municipalities
3. Other

G. Low-head hydro

H. Pumped storage

I. Solar

1. Wind

2. Space or water heating/cooling

3. Photovoltaic

4. Biomass

5. Other

J. Geothermal

K. Other

The States' responses, summarized in tables 7-16, provide the basis for making several observations regarding alternatives to building conventional powerplants. Moreover, this information is useful for making both absolute and relative comparisons among alternatives. General conclusions follow table 16. However, the following specific information can be gleaned by a review of the tables 7 through 16.

1. For each identified alternative, the number of States that

   - have statewide studies,
   - do not have statewide studies,
   - have studies by utility service areas, and
   - have studies in process.

2. The relative degree to which States have studied each alternative.

3. For each alternative, the opinions of the States regarding significance of potentials.

4. The relationship between the number of studies conducted and the number of studies resulting in an identified potential.

The States' responses are summarized in the following tables.

Table 7A

Production Improvements:
Studies of Potential

	None statewide	Yes, statewide	Yes, by service area/ case by case	Study in process	Total
A. 1	27	5	3	1	36
A. 2	20	10	5	1	36
A. 3	27	2	7	0	36
A. 4	26	1	9	0	36

Table 7B

Production Improvements:
Significance of Potential

	A. 1	A. 2	A. 3	A.4
No response/blank	27	20	27	26
Not significant	2	1	2	2
Not quantified, no opinion on significance	4	7	6	7
Quantified, no opinion on significance	3	4	1	1
Significant, not quantified	0	2	0	0
Significant, quantified	0	2	0	0
Total	36	36	36	36

Table 8A
Grid Developments:
Studies of Potential

	None statewide	Yes, statewide	Yes, by service area/ case by case	Study in process	Total
B.1	18	8	8	2	36
B.2	19	7	8	2	36
B.3	18	8	8	2	36

Table 8B

Grid Developments:
Significance of Potential

	B.1	B.2	B.3
No response/blank	20	21	20
Not significant	7	7	7
Not quantified, no opinion on significance	7	7	7
Quantified, no opinion on significance	0	0	0
Significant, not quantified	0	0	0
Significant, quantified	2	1	2
Total	36	36	36

Table 9A

Conservation Initiatives:
Studies of Potential

	None statewide	Yes, statewide	Yes, by service area/ case by case	Study in process	Total
C.1	14	15	7	0	36
C.2	18	9	7	2	36
C.3	17	8	9	2	36
C.4	9	18	7	2	36

Table 9B

Conservation Initiatives:
Significance of Potential

	C. 1	C. 2	C. 3	C.4
No response/blank	14	20	19	11
Not significant	1	1	1	1
Not quantified, no opinion on significance	13	12	13	16
Quantified, no opinion on significance	3	2	2	2
Significant, not quantified	2	1	1	3
Significant, quantified	3	0	0	3
Total	36	36	36	36

Table 10A

Pricing and Rate Structures:
Studies of Potential

	None statewide	Yes, statewide	Yes, by service area/ case by case	Study in process	Total
D.1	16	6	10	4	36
D.2	10	7	10	9	36
D.3	12	7	9	8	36
D.4	18	5	8	5	36
D.5	20	4	8	4	36

Table 10B

Pricing and Rate Structures:
Significance of Potential

	D.1	D.2	D.3	D.4	D.5
No response/blank	20	19	20	23	23
Not significant	1	0	1	0	0
Not quantified, no opinion on significance	12	14	12	11	11
Quantified, no opinion on significance	1	1	1	1	1
Significant, not quantified	1	1	1	0	1
Significant, quantified	1	1	1	1	0
Total	36	36	36	36	36

Table 11A

Load Control Devices:
Studies of Potential

	None statewide	Yes, statewide	Yes, by service area/ case by case	Study in process	Total
E.	19	3	8	6	36

Table 11B

Load Control Devices:
Significance of Potential

	E.
No response/blank	25
Not significant	1
Not quantified, no opinion on significance	4
Quantified, no opinion on significance	4
Significant, not quantified	1
Significant, quantified	1
Total	36

Table 12A

Cogeneration Projects:
Studies of Potential

	None statewide	Yes, statewide	Yes, by service area/ case by case	Study in process	Total
F.1	18	9	5	4	36
F.2	20	8	5	3	36

Table 12B

Cogeneration Projects:
Significance of Potential

	F.1	F.2
No response/blank	22	22
Not significant	2	2
Not quantified, no opinion on significance	3	5
Quantified, no opinion on significance	4	4
Significant, not quantified	2	1
Significant, quantified	3	2
Total	36	36

Table 13A

Low Head Hydro:
Studies of Potential

	None statewide	Yes, statewide	Yes, by service area/ case by case	Study in process	Total
G.	18	14	3	1	36

Table 13B

Low Head Hydro:
Significance of Potential

	G.
No response/blank	19
Not significant	4
Not quantified, no opinion on significance	3
Quantified, no opinion on significance	8
Significant, not quantified	1
Significant, quantified	1
Total	36

Table 14A

Pumped Storage:
Studies of Potential

	None statewide	Yes, statewide	Yes, by service area/ case by case	Study in process	Total
H.	24	5	6	1	36

Table 14B

Pumped Storage:
Significance of Potential

	H.
No response/blank	25
Not significant	1
Not quantified, no opinion on significance	5
Quantified, no opinion on significance	3
Significant, not quantified	1
Significant, quantified	1
Total	36

Table 15A

Solar:
Studies of Potential

	None statewide	Yes, statewide	Yes, by service area/ case by case	Study in process	Total
I.1	19	10	4	3	36
I.2	14	11	7	4	36
I.3	27	3	4	2	36
I.4	21	8	5	2	36

Table 15B

Solar:
Significance of Potential

	I.1	I.2	I.3	I.4
No response/blank	25	18	29	23
Not significant	1	2	0	1
Not quantified, no opinion on significance	6	12	5	7
Quantified, no opinion on significance	1	1	0	2
Significant, not quantified	2	2	1	2
Significant, quantified	1	1	1	1
Total	36	36	36	36

Table 16A

Geothermal:
Studies of Potential

	None statewide	Yes, statewide	Yes, by service area/ case by case	Study in process	Total
J.1	25	6	2	3	36

Table 16B

Geothermal:
Significance of Potential

	J.
No response/blank	28
Not significant	0
Not quantified, no opinion on significance	3
Quantified, no opinion on significance	3
Significant, not quantified	1
Significant, quantified	1
Total	36

In summary, conservation initiatives (information programs and energy audits) (table 9A) and low-head hydro (table 11A) received more statewide study than any other alternatives. Yet, even for these alternatives less than one-half of the responding States completed studies in these subject areas. For the remaining alternatives, described in tables 7-16, generally less than one-fourth of the responding States have studies of statewide potential.

In several States particular alternatives have been studied on a utility service area basis rather than statewide. Service area studies are most prevalent for pricing and rate structures (table 10A), grid developments (table 8A), conservation initiatives (table 9A), load control devices (table 11A), and certain types of production improvements (table 7A). However, even for the alternatives most prevalently studied on a service area basis, less than one-fourth of the States approach the study of alterntives in this manner. Moreover, in many of those States where alternatives are studied on this basis, those studies focus on individual utilities, do not purport tc examine the potential alternatives beyond the direct control of a utility and are not coordinated to identify overall statewide potential.

When statewide studies are combined with utility service area studies the most studied alternatives (at least 15 States) are conservation initiatives (table 9A), grid developments (table 8A), low head hydro (table 13A), solar space or water heating/cooling, and certain pricing and rate structure alternatives and certain production improvements. Yet, only certain conservation initiatives (information programs and energy audits) were studied in more than one-half the responding States (22 and 25 of 36, respectively).

In order to be useful for electricity planning purposes studies of alternatives, whether on a statewide or service-area basis, should result in a reasonably accurate quantitative description of the alternatives potential contribution to balance future electricity supply and demand. The States' opinions, summarized in tables 7B through 16B, demonstrate that either the alternatives have not received quantitative evaluation or significant potentials do not exist. Furthermore, the responses indicate that in most States the results of the studies have had relatively little influence on the electricity planning process.

During the course of collecting and analyzing the States' responses, it became clear that the "significance" of a potential was a rather subjective standard. Consequently, the States' responses were summarized in both quantitative and qualitative terms. The following observations can be gleaned from tables 7B through 16B.

--Less than one-third (and generally less than one-fifth) of the States had any opinion whatsoever on the significance of the potential for any of the identified alternatives.

--Except for energy conservation audits (table 9B), less than six States said that a significant potential for any alternative had been identified through studies.

--Most States had not quantified the potentials of alternatives or had no opinions on the significance of an alternative's potential contribution to balancing future demand and supply.

C.2. What have been the significant public issues or management concerns raised in the last 3 years relating to non-conventional alternatives and how were they addressed by the States?

Each State was asked to identify those important public issues and management concerns that have impacted most on decisions of how best to secure new power supplies. Several issues were set forth to illustrate the types of concerns that could have arisen.

Some of the identified issues or management concerns are directly relevant to the question of non-conventional alternatives while others affect the broader decisions involved in balancing supply and demand.

The issues identified were:

--What rate of load growth is likely for the 1980s?

--Which fuel sources are least likely to be interrupted?

--What opportunities exist for exchanges and purchase agreements with other utilities?

--Will fossil fuels or nuclear plants prove more economical on an electric power supply (life-cycle) basis?

--Which power supply options are most acceptable to the general public?

--What are the long-term social and environmental impacts of alternative power supply options?

--How soon will renewable energy technologies be technologically feasible and economically practicable?

--Can the continuing cost escalation in thermal plant construction be slowed or stopped?

--Can the responsible Government and utility officials satisfactorily deal with nuclear waste and fuel reprocessing problems?

--Other.

In a separate question, each State was asked to identify the public hearing or other communication forums established to encourage citizen participation in planning the State's electrical energy future. In addition, each State was asked to identify the important planning issues that surfaced and whether the best means to resolve these issues had been documented in hearings or other reports.

While a few States considered non-conventional alternatives as major issues, most States identified significant concerns or issues other than non-conventional alternatives. The following table ranks the responses to the suggested issues and concerns in terms of the number of States in which the issues were deemed significant in the last 3 years.

Table 17

Issues of Significance

	Yes	No
Rate of load growth likely in the 1980s	35	6
Opportunities for exchanges and purchases with other utilities	28	13
Comparative economics (life-cycle basis) of fossil-fuel and nuclear powerplants	24	17
The long-term social and environmental impacts of alternative power supply options	22	19
Fuel sources least likely to be interrupted	21	20
Power supply options most acceptable to the general public	20	21
Cost escalation in construction of thermal plants	20	21
Governments' and utilities' ability to satisfactorily deal with nuclear waste and fuel reprocessing problems	18	23
Renewable energy technologies: feasible and economically practicable	17	24

While most States had established communication forums to encourage citizen involvement in planning the States' electrical energy future, the number of States was less than expected given the widespread public interest in the economic, environmental, and social cost associated with electric power. Twenty-four of the 41 responding States had established such forums. However, 18 of these States were relying primarily on traditional forums such as siting and rate hearings to provide an opportunity for citizen involvement.

The concerns of the public may arise in traditional State administrative forums (rate cases, siting hearings, etc.) not specifically established for comprehensive State electric energy planning or for the explicit purpose of obtaining citizen involvement in balancing supply and demand for electricity or overall energy usage. However, it was generally acknowledged that, to date, the range of issues addressed in the existing forums, the time frame of paramount concern to decisionmakers, and the adversarial nature of these forums do not lend themselves to a thorough examination of broader energy policies or longer-term electricity planning issues. These forums generally do not provide the public with an effective opportunity to participate in the early planning efforts which precede specific utility proposals to cite new facilities or to obtain rate relief.

C.3. How is information on electric energy planning disseminated to the public?

Each State was asked how information on electric energy planning and regulatory programs was given to the public. Three types of documents or forums were suggested--annual reports, periodic progress reports, and public hearings. In addition, several States identified other documents or forums, such as news releases, advertisements, or legislative hearings. Over 90 percent of the responding States use annual (or biannual) reports or public hearings to communicate with the public.

About two-thirds of the States have not used reports or public hearings to document how best to resolve significant electricity planning within the State. While many States have transcripts of hearings available for public review, relatively few States take positive action to disseminate information on issues to the public. In short, data collection is a far cry from information dissemination, particularly for reasonably informing the public of the essential facts, the major issues, and the benefits and costs associated with alternative means to balance future supply and demand.

D. What rewards or sanctions have State regulatory agencies established to encourage utilities to study or adopt non-conventional alternatives and to identify and implement cost effective projects/programs for balancing power supply and demand?

Utilities, like all businesses, react to cost, price, and the rate of return on investment, and they cannot be expected to intentionally reduce the earnings of their owners. In particular, the earnings of investor-owned utilities are regulated on the basis of a percentage of its capital investments--the larger its net investment in generation and transmission facilities the larger its potential profits. A number of the alternatives to conventional generating facilities could limit future electric utility investment and profit growth for investor-owned utilities. For example, demand reducing measures such as conservation could substantially reduce the future growth rate for electricity. Widespread use of solar technologies such as solar water or space heating could displace the need for additional large blocks of electric power. Wider use of other technologies such as low-head hydro projects, windmills, and cogeneration could result in the development of significant amounts of generating capacity by energy consumers. This again could result in a significant leveling off of the demand for electricity from utilities in future years. However, these non-conventional alternatives could help balance future electrical demand and supply at a lower social, environmental, and economic cost than conventional generating alternatives. Accordingly, each State was asked what were the primary incentives or sanctions it used, if any, to encourage utilities to

--explore conservation and load management options;

--consider cogeneration projects and contracts/exchanges/interties with other utilities or industries; and

--use renewable resources and to consider non-conventional technologies, such as low-head hydro, wind, geothermal, biomass, or solar heating/cooling systems in lieu of building conventional powerplants.

Each State was also asked if it possessed the authority to require utilities to study and implement cost-effective projects or practices in the above described subject areas. Moreoever, each State was asked whether this authority,

if any, had been exercised within the last 3 years and if so, what were the principal reasons for the State's actions.

Conservation and load management options

The majority of the States (39 of the 42 responding States) have the authority to require utilities to study and to implement cost-effective conservation and load management practices. Approximately 60 percent of the States have exercised this authority within the last 3 years.

Table 18

Exercised Authority
Conservation and Load Management

Yes, both to study and to implement	26
No, neither to study nor to implement	7
Study only	8
No comment	1
Total State response	42

However, less than one-fourth of the responding States said that satisfactory progress was clearly being made regarding conservation and load management in terms of the number or types of projects submitted or implemented by the electric utilities in the past 3 years. Approximately one-half the States believed that satisfactory progress was not being made by the utilities. The remainder of the States either had no opinion, believed that progress was satisfactory for only some utilities, or were satisfied at present but expect substantially more progress in the future.

A majority of the States responding to the question do not use specific incentives or sanctions to encourage utilities to explore conservation and load management options. This majority is composed of 10 States that said they do not have sanctions or incentives, 4 States who currently do not have incentives but are studying their potential value, and 16 States that either "jawbone" utilities or merely order utilities to study or implement certain conservation or load management options.

Those states (12) that said they used incentives or sanctions rely primarily on customer rate design techniques such as time-of-day pricing, and do not specifically establish direct incentives or sanctions for the utilities to explore conservation or load management options.

Cogeneration and interties

While fewer in number than for conservation and load management, most of the States (29) said they have the authority to require utilities to study and implement cost effective cogeneration projects and contracts/exchanges/interties with other utilities or industries. However, as shown in the following table, relatively few have exercised their authority in the last 3 years.

Table 19

Exercised Authority
Cogeneration and Interties

Yes, both to study and to implement	8
No, neither to study nor to implement	28
Study only	1
No comment	4
Total State response	41

Less than a majority of the responding States believed that the utilities were making satisfactory progress in terms of proposals or projects submitted for approval or implemented in the past 3 years. For cogeneration, 14 States were satisfied, 22 were not satisfied, and 5 had no comment. For interties/contracts/exchanges 17 States were satisfied, 19 were not, and 5 had no comment. Several States said they were satisfied with the utilities' progress regarding these alternatives even though no projects were proposed or implemented in the last 3 years. Relatively few States (7) said they use direct incentives or sanctions to encourage cogeneration projects or contracts/interties/exchanges. Of these seven States, two have special rates for backup power charged consumers and two noted favorable expense treatment for studies and research and development expenses.

Table 20

Incentives or Sanctions:
Cogeneration and Interties

None	21
No comment	1
"Jawbone"	6
None, but under study	6
Yes	7

A few States mentioned that their role regarding interties/exchanges is perceived, at the least, to be limited by Federal Energy Regulatory Commission's role in approving wholesale rates, exchanges, and in intertie decisions.

Renewable Energy Sources

While approximately three-fourths of the responding States have the authority to require utilities to study and to implement cost-effective renewable energy projects, few States have exercised this authority in the last 3 years.

Table 21

Exercised Authority:
Renewable Energy Projects

Yes, both to study and to implement	2
No, neither to study nor to implement	30
Study only	3
No comment	6
Total State response	41

Relatively few States (7) have incentives or sanctions to encourage utilities to consider renewable technologies, such as low-head hydro, wind, geothermal, biomass, or solar heating/cooling systems in lieu of building conventional powerplants. However, only two of these States specifically mentioned rate-of-return incentives for utilities. The remaining five States mentioned incentives for consumers.

Table 22

Incentives/Sanctions:
Renewable Energy Projects

None	22
"Jawbone"	9
None, but question under study	3
Yes	7

Some of the incentives mentioned by the States were higher rates of return, treatment of research and development as an allowable operating expense, and streamlined approval procedures.

Less than one-half the States stated they believed their utilities were making satisfactory progress in addressing renewable resource energy options in the last 3 years (17 yes; 18 no; 6 no comment). It must be noted that in those States that indicated utilities were making satisfactory progress approximately one-half had no projects proposed or implemented and accordingly believed no progress was, in itself, "satisfactory."

D.1. How do the States plan to respond to the Public Utility Regulatory Policies Act of 1978 and the national policies it establishes?

On November 9, 1978, the President signed into law several energy-related acts, known collectively as the National Energy Act. One of these acts, the Public Utility Regulatory Policies Act (PURPA) directly affects the States' regulatory processes and policies governing electric utilities. Several standards, including rate design, are established for electric utilities in order to meet the three purposes of title I of the act which are to encourage "conservation of energy supplied by electric utilities; the optimization of the efficiency of use of facilities and resources by electric utilities; and equitable rates to electric consumers." In general, these standards are to be considered and acted upon (either favorably or unfavorably) within the next 3 years by the State agencies responsible for approving utility practices, particularly rates to be charged consumers. Each State was asked to describe the actions taken, or planned to be taken, to meet the three purposes of title I of the act. Forty-two States responded, in some manner, to this question.

During our inquiry, the States were in the early stages of addressing the policies and standards mandated by title I of PURPA. At that time, the States did not generally believe that PURPA would require a major reexamination or significant changes in existing State laws, policies, or utility planning and management practices. Twenty States have either held hearings, have hearings in process, or plan to hold generic or individual utility hearings on PURPA requirements within the time frame established by the act. Five States have either taken no action or are awaiting promulgation of DOE regulations that further delineate PURPA's procedural and substantive requirements. Nine States are in a "talking phase" but have not identified specific actions to address PURPA standards. Nine States have various PURPA standards under study at the State level.

The Congress recognized that several States had previously addressed the standards set forth in PURPA in their own State proceedings. Consequently, the Congress authorized the State to use previous proceedings and actions in meeting PURPA standards (with a few exceptions) without the necessity for additional formal consideration by the State if such proceedings "substantially" conformed to the requirement of the act. In brief, the Congress allowed the States to "grandfather" previous actions and decisions to satisfy most of the PURPA requirements.

Most States, as described below, intend to rely heavily on the grandfather provision (16 U.S.C. 2634), in lieu of formal reconsideration, to meet the PURPA requirements. Fifteen States intend to grandfather most of the standards and 6 states intend to do so for some of the standards. Moreover, 10 States appear to be favoring the grandfather approach. Of the 42 States responding to this question, only 11 did not state or clearly imply their intention to utilize the grandfather provision to a substantial degree.

Based on the States' responses, it is doubtful whether title I of PURPA has provided sufficient direction to the States or the electric utilities covered by the Act to ensure that they actively and aggressively pursue the Act's purposes. The responses of the States to previous questions make it clear that most States do not believe that satisfactory progress is being made in several of the areas, such as conservation, load management, and rate reform that are addressed by PURPA's purposes and standards. Moreover, less than one-fourth of the responding States are planning to take a fresh look at

the potential benefits and costs of the PURPA provisions. This conclusion is based, in part, on the number of States which plan to grandfather PURPA's standards.

D.2. How are citizens encouraged to participate in energy planning?

A bare majority of the responding States believe they have the legal responsibility to "assure adequate public and legislative participation in power system planning and policy making." Moreover, this opinion was primarily restricted to investor-owned public utilities. Consequently, from a total electricity usage perspective in the State, less than 25 percent of the States responding believe they have the legal responsibility for assuring public involvement in total system planning within the State, i.e., both investor-owned and publicly owned utilities.

A perceived lack of legal responsibility does not necessarily mean that the States have not established communication forums to encourage citizen participation in planning a State's electrical energy future. When asked whether communication forums had been established, 24 of the 41 responding States said yes. However, most of these States rely on traditional public communication mechanisms, such as site or ratemaking hearings. These types of hearings have generally been of limited scope, i.e., confined to one utility within a State and consequently may not offer an opportunity for a comprehensive overview of system planning within the State.

For additional information on public involvement in electricity planning, see C(3).

D.3. How are non-conventional alternatives treated for ratemaking purposes?

As noted in (F) p. 115 the States vary in their perception of their legal responsibilities to consider non-conventional alternatives in electric system planning. Moreover, the perception varies with the particular forum and alternative involved. The primary forum in which financial incentives or disincentives for utilities are established is in ratemaking. The primary question is normally whether the cost of an item is allowed in the rate base (upon which a fair rate of return is allowed), treated as a legitimate expense (no return allowed), or not allowed as an expense and thus the cost is borne by the company's shareholders.

Practically all of the responding States do not discriminate between conventional and non-conventional investments for ratemaking purposes. Few States have modified their ratemaking processes and policies to provide additional incentives for encouraging utilities to implement non-conventional alternatives. Thirty States indicated there is no discrimination, and 9 States have no policy but address the question on a case-by-case basis. In general, the States take a passive role rather than an active role in the treatment of non-conventional investments. This conclusion was confirmed by the States' response to three related questions.

First, each State was asked if the utilities were able to earn as much money for their shareholders on non-conventional investments as they are on conventional investments. Twenty-nine of the 42 responding States gave an unqualified "yes." Four States were unaware of any policy or problem, and four States have no policy but address the question on a case-by-case basis. Only one State indicated that a utility was not allowed to earn as much, but it is unclear whether the rate of return on investment or the total amount of funds earned from the investment was in mind.

Second, each State was asked if it is more difficult for utilities to raise capital for investments in non-conventional projects than for investments in conventional generation plants. The States, in general, believed that the types of investment were of little concern to the financial community (bond and equity markets). The financial integrity of the utility was viewed as the overriding concern of the financial community.

Fourteen of the 42 responding States said that no financial investment barriers exist to discourage utility involvement with non-conventional alternatives. An additional 13 States said that the question of financial investment barriers had not arisen in State proceedings to date, 4 States said probably no barriers exist, 1 State said that the question was addressed on a case-by-case basis, and 7 States had no comment. Three States said there were financial investment barriers, because of a greater perceived risk associated with new technologies or non-conventional investment. However, the potential for States to use their ratemaking authority, particularly the allowance of higher rates of return on investments in non-conventional alternates, is attracting interest in several States.

Finally, each State was asked whether the earnings of electric utilities were regulated to reflect how good or poor a job they do in balancing supply/demand at the lowest overall economic, environmental, and social costs.

The States' responses reflect the traditional perception of the appropriate role of the State in the regulation of utility earnings. The traditional approach focuses almost entirely on the appropriate rate of return on the utilities' investment rather than on overall utility management's performance in balancing all the benefits and costs (both internal and external) of providing electricity.

Forty-one States responded to this question. Their summarized responses are:

Table 23

Regulate Performance in Balancing Supply and Demand

No	18
Probably no, but	
no policy	4
question never raised	5
case-by-case	5
Unknown	3
No comment	4
Qualified yes	2

The reasons given by the 18 States responding "no" were:

Table 24

Earnings per share not regulated	6
Regulate rate of return to assure adequate, least-cost service.	
No reason given	5
Rates not based on components of rate base	2
No balancing--apply prudent investment rule	1
Would add confusion--reduce objectivity of rate of return	1
State considered and rejected	1
Only indirect--consider overall management performance	2

E. Do State regulatory agencies believe they are adequately staffed and funded to do an effective job of evaluating utility planning practices?

Most States believed that they were not adequately staffed and funded to meet their present responsibilities for evaluating utility planning practices. The requirements of PURPA were viewed, at the least, as adding to this gap between responsibility and capability. Because most of the States (30 of 38 with comments in response to this question) believed they were presently suffering from this shortfall in capability, PURPA increased, but did not apparently cause the problem (at the time of the inquiry, no authorized Federal funds had been allocated to the States to assist in carrying out PURPA's title I requirements). This situation is consistent with the fact that most States intend to "grandfather" PURPA standards. (See D.1.)

In addition to questions on the adequacy of resources to meet current responsibilities and to meet additional responsibilities suggested by PURPA, each State was asked to identify the specific areas in which shortages were most

seriously limiting the effectiveness of their capability to evaluate utility planning practices. States responded by identifying either specific types of disciplines (generally financial and economic expertise) or specific subject areas. The subject areas most often mentioned by the States, in descending order, were

--load forecasting review,

--determination of cost of service,

--rate design,

--ability to examine alternatives,

--data collection and storage, and

--conservation.

E.(1) Have the Federal Government's energy agencies been of substantial assistance to the State in evaluating and improving the quality of electricity planning/management practices?

Each State was asked what the U.S. Department of Energy (DOE) had done to assist the State in evaluating and improving the quality of electric utility plans and planning/management practices in terms of grants, information services, and technical assistance. Approximately one-half of the responding States said they had received some form of grant assistance from DOE. However, less than one-half of the States indicated that they had used DOE information services or received technical assistance.

In addition, each State was asked to identify any other Federal agencies, such as the Nuclear Regulatory Commission (NRC) that had been of assistance. Few States believe they have received significant assistance from other Federal agencies regarding electricity management or planning. However, NRC was mentioned as providing assistance by eight States.

In addition to the above questions on how the Federal agencies had been of assistance, each State was asked if Federal agencies had a negative impact on State or utility plans or projects within the last 3 years. Specifically, each State was asked whether any of the Federal energy regulators (such as NRC, ERA, FERC) had acted to prevent or delay construction of a conventional powerplant because utility plans or planning practices were inadequate. Few States

mentioned any such actions although the line between planning inadequacies and other causes of delay was generally unclear based on the States' response.

E.(2) What more could the Federal agencies be doing to help the States improve the quality of electricity management planning?

While it is clear that over one-half States want some form of Federal assistance, it is also clear that opinions vary substantially regarding the subject areas to be covered and the form such Federal assistance should take. Forty-two States responded to the direct question of whether they wanted any Federal assistance. Their responses are summarized as follows:

Table 25

States Wanting Federal Assistance

Yes	17
Yes, but it depends on the terms and conditions	7
No comment	9
No, not unsolicited	3
No	6

Each State was asked to identify what actions Federal agencies could take to help State regulators and private sector decisionmakers improve the quality of public and private sector electricity management planning. While 11 States said "nothing" and 4 States suggested leaving the States "alone," the majority of the States had suggestions for the Federal agencies. These suggestions fell into two broad categories: actions the Federal agencies could take with relation to State government and actions the Federal agencies should take within or among themselves. For the former, the responses of the States fell generally into three categories: money, technical assistance, and information services. The responses of the States are summarized below:

Table 26

Specific Types of Assistance

	Money
5	For staff
4	For studies at State level
3	Commitment to long-term National Energy Act funding
2	Studies at Federal level
1	Studies at regional level
1	Work of low priority to State but of national concern
	Technical Assistance
4	Forecasting/modeling
3	Training sessions
2	Workshops
2	Presentation of Federal perspective
1	Data bank development
1	Studies at State level
	Information Services/Studies
3	Notice and description of ongoing studies
2	Information in general
1	Cost/price information regarding alternative generation options

In addition to the responses summarized above, each State was asked to identify specific areas where either new Federal programs or services should be started or existing programs or services should be improved or terminated. Few States had

specific suggestions for new Federal programs or services; 11 States had no specific suggestions, and 21 States had no opinion. This general lack of response appears to be largely attributable to a lack of knowledge of the Federal programs being developed under the National Energy Act.

Most States (32) had no opinion regarding which Federal programs should be terminated. Only six States had reasonably specific opinions on programs or services that should be terminated. These suggestions primarily concerned decreased Federal involvement in State-level decisionmaking and elimination of unnecessary or irrelevant data collection or reporting requirements.

Twenty-four States had reasonably specific suggestions for the improvement of Federal programs while only 13 States had no comments and only 4 had an unqualified response in the negative.

Perhaps, because of the traditional State role in electricity management, and the relatively new Federal involvement in the subject area, most of the States' suggestions for improvements in Federal programs concerned program management, policy formation, and intergovernmental coordination (though the line between the categories is admittedly a subjective one). Several States identified needed improvements in existing Federal electrical energy programs although few of the specific improvements noted by the States were mentioned by more than two States. Listed below, in order of descending priority, is a summary of the States' responses.

Table 27

Major State Suggestions for Improving Federal Programs

Program management

More and better data before program implementation

Ensure statistical data is accurate and current

Establish longer range planning horizon

Improve clarity and timeliness of regulations and guidelines

Policy formation

Focus on alternative technology demonstration projects or studies, including potential for technology transfer and commercialization

Clarify Federal policies for generic versus case-by-case standard development and implementation at State level

Intergovernmental coordination

Improve Federal/State coordination at regional level

Focus funds and technical assistance on State identified concerns and clarify national interest in same

Foster State involvement in Federal decisionmaking, particularly on wholesale rate design and pooling

Ensure Federal representatives adequately understand and properly express national concerns and priorities to the States

It should be noted that those States that purport to have actively pursued improved electricity planning and management attribute their active concern to their own initiative, not

to actions or assistance of the Federal Government. No State attributed their actions primarily to the passage of the Public Utility Regulatory Policies Act.

Several States said that a key to effective integration of non-conventional alternatives, particularly conservation, is development of a statewide concern or consensus on the overall benefits and costs of electricity production and usage to the State. The Federal Government was perceived by these States as providing potentially valuable assistance to the States in this area.

F. What are the principal State or local government agencies responsible for meeting electricity management duties? How are Government decisions for power supply coordinated?

Based on a review of existing State and Federal law and the relevant literature, a number of electricity management duties were identified. Each State was asked what were the principal State and local agencies, if any, responsible under law for meeting these duties. Several States identified specific State statutes that prescribe the responsible agency. However, the principal focus of this inquiry was on perceived responsibility, not specific statutory authority. The duties identified were the following:

--Assuring adequate public or legislative participation in power system planning and policymaking.

--Assuring that the potentials of renewable energy sources are developed.

--Assuring that electricity demand forecasts are accurate and realistic.

--Assuring that cost-effective conservation programs and projects are implemented.

--Assuring that the costs and the benefits of alternative methods of meeting future power needs are carefully evaluated and compared before capital investment (rate base) decisions are made.

--Exercising controls to minimize the impacts (including cost) of constructing powerplants and transmission/distribution facilities.

--Assuring the reliability of power supplies for residential, commercial, and industrial customers.

--Assuring that power rates charged industrial, commercial, and residential customers are equitable, encourage conservation (and discourage waste), and include the appropriate costs of service.

Each State's response is summarized in the following categories: (1) no agency responsible, (2) traditional Public Service Commission solely responsible, (3) responsibility shared between traditional Public Service Commission and another State agency, and (4) responsibility with another State agency.

Table 28

State Agencies Responsible for Assuring Adequate Public or Legislative Participation in Power System Planning and Policymaking

	For both investor-owned and publicly owned utilities	For only investor owned utilties	For only publicly owned utilities
Responsibility: (note a)			
With no State agency	14	0	17
With PSC alone (note b)	3	4	0
Shared between PSC and another State agency	2	12	0
With agency other than PSC	3	2	1
	22	18	18

a/ Eleven States either did not respond to the survey or did not answer this particular question.

b/ A Pubic Service Commission (PSC) is a generic name used throughout this report to describe that State agency with traditional responsibility for review and approval of electric utility project proposals and rates.

Table 29

State Agencies Responsible for Assuring that the Potentials of Renewable Energy Sources are Developed

	For both investor-owned and publicly owned utilities	For only investor-owned utilities	For only publicly owned utilities
Responsibility:			
With no State agency	5	0	17
With PSC alone	3	7	0
Shared between PSC and another State agency	2	4	0
With agency other than PSC	10	9	3
	20	20	20

Table 30

State Agencies Responsible for Assuring that Electricity Demand Forecasts are Accurate and Realistic

	For both investor-owned and publicly owned utilities	For only investor-owned utilities	For only publicly owned utilities
Responsibility:			
With no State agency	4	0	18
With PSC alone	9	15	0
Shared between PSC and another State agency	4	4	1
With agency other than PSC	2	2	2
	19	21	21

Table 31

State Agencies Responsible for Assuring that Cost-effective Conservation Programs and Projects are Implemented

	For both investor-owned and publicly owned utilities	For only investor-owned utilities	For only publicly owned utilities
Reponsibility:			
With no State agency	3	0	18
With PSC alone	6	7	0
Shared between PSC and another State agency	4	8	0
With agency other than PSC	7	5	2
	20	20	20

Table 32

State Agencies Responsible for Assuring that the Costs and Benefits of Alternative Methods of Meeting Future Power Needs are Evaluated

	For both investor-owned and publicly owned utilities	For only investor-owned utilities	For only publicly owned utilities
Responsibility:			
With no State agency	2	0	23
With PSC alone	8	21	0
Shared between PSC and another State agency	3	4	2
With agency other than PSC	1	1	1
	14	26	26

Table 33

State Agencies Responsible for Exercising Controls to Minimize the Impacts (including costs) of Constructing Power Plants and Transmission/Distribution Facilities

Responsibility:	For both investor-owned and publicly owned utilities	For only investor-owned utilities	For only publicly owned utilities
With no State agency	1	0	20
With PSC alone	6	14	1
Shared between PSC and another State agency	6	8	0
With agency other than PSC	4	1	2
	17	23	23

Table 34

State Agencies Responsible for Assuring the Reliability of Power Supplies for Residential, Commercial, and Industrial Customers

Responsibility:	For both investor-owned and publicly owned utilities	For only investor-owned utilities	For only publicly owned utilities
With no State agency	1	0	26
With PSC alone	9	18	0
Shared between PSC and another State agency	2	5	0
With agency other than PSC	2	3	0
	14	26	26

State Agencies Responsible for Assuring that Power Rates Charged Industrial, Commercial, and Residential Customers are Equitable, Encourage Conservation (and Discourage Waste), and Include the Appropriate Cost of Service

	For both investor-owned and publicly owned utilities	For only investor-owned utilities	For only publicly owned utilities
Responsibility:			
With no State agency	0	0	25
With PSC alone	13	26	0
Shared between PSC and another State agency	0	0	0
With agency other than PSC	1	0	1
	14	26	26

In addition to the above responsibilities, each State was asked to identify the State agencies responsible for assuring that new powerplants and transmission facilities do not violate State and Federal environmental standards. Because most of the standards do not distinguish between investor-owned and publicly-owned utilities, the responses of the States are summarized in narrative form.

In most States (24), this responsibility lies with an agency other than a traditional PSC. In 5 States, a traditional PSC has the sole responsibility, while in 10 States this responsibility is shared with another agency. Only one State indicated that the responsibility was not explicitly met, while three States did not respond to this particular question and eight States did not respond to the survey.

Coordination of Power Supply Planning

The States were asked to identify the existing mechanisms, at distinct geographical or institutional levels, through which power supply planning is coordinated among decisionmaking authorities. These levels were identified as: among sub-State regions, within the State, among the States, within the electric reliability region, and with various agencies of the Federal Government. In addition, each State was asked its opinion as to the effectiveness of the identified mechanisms in achieving coordinated power supply planning. Forty-one States responded to this question.

At each level of identified potential coordination the responses of the States were categorized as: (1) no mechanism; (2) informal--either through utilities, with governments, or both; and (3) formal. "Effectiveness" opinions were classified as either (1) effective, (2) not effective, or (3) no opinion/no problem.

Most States have either informal or no mechanisms for coordinating decisionmaking authorities and actions for power supply planning. Only at the electricity reliability council level did a majority of States indicate that a formal mechanism existed. The status of coordination is set forth below:

Table 36

Status of State Coordination
for Power Supply Planning (note a)

		Informal (note b)				
	No mechanism	Through utilities	With gov'ts	Both	Formal	Total
Among substate areas or units of local government	21	4	2	6	8	41
Among units of State government	9	4	5	7	16	41
Among States	11	3	6	6	15	41
Within reliability region	12	2	2	1	24	41
Between Federal and State Government	15	1	16	-0-	9	41

a/It should be noted that coordination varies by regions as well as by individual States. Table 36 portrays State opinions but does not portray regional variations.

b/In these States, the principal coordination activities occur on an informal and usually ad hoc basis. Some of the States rely primarily on the utilities while others address the concerns through direct but informal contacts.

The overall effectiveness of the existing mechanisms in meeting the need for coordinated power supply planning is difficult to determine from the States' responses to the survey. Perhaps surprisingly, a majority of the States had either no problem with or no opinion on the effectiveness of coordination mechanisms. While the States with an opinion indicated the mechanisms were effective more often than not (except in relationship to the Federal Government) by far the majority had no opinion or believed that coordination was not a significant problem in power supply planning. The States' opinions are summarized below.

Table 37

Effectiveness Of Coordination Mechanisms

	Effective	Not effective	No opinion/ no problem	Total
Substate	6	2	33	41
State	9	4	28	41
Among States	11	5	25	41
Reliability region	11	4	26	41
Federal agencies	5	8	28	41

However, the high percentage of States that either had no opinion regarding the effectiveness of coordination activities or had no problems with existing mechanisms should be placed in context. For example, most States do not formally consider their own non-electrical energy policies, plans, or programs (or merely view them as technical constraints) in their electric energy supply planning decisionmaking processes. Moreover, most coordination seems to require action by other agencies to bring their concerns to the attention of the responsible State agency. In addition, only a minority of the States assure that other State agencies, plans, or goals (such as economic development, land use, energy conservation, envi-

ronmental quality) are incorporated into the assumptions used for electricity demand forecasts upon which utility rate approval is based.

It should be noted that the States' responses regarding the current accuracy of attachment I, "Elements of Load Forecasting Need for Power," confirms the proposition that relatively little consideration is given to power supply coordination outside of a utility's service area or its power pool.

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ATTACHMENT I

ELEMENTS OF LOAD FORECASTING NEED FOR POWER

APPENDIX I

STATE	(1) Explicit legal requirements for making a need for power decision				(2) Need for power decision made		(3) FACTORS CONSIDERED IN FORECASTING FOR PURPOSES OF MAKING NEED FOR POWER DECISIONS																										(4) Entity Making Demand Forecast				(5) Forecast Range (years)
							A. Geographic				B. Demand											C. Supply							D. Cost								
							1. Service area of single applicant utility		2. Service areas of each member utility of joint venture																												
	A. Statute	B. Procedures	C. Rules	D. Informal guidelines	A. In a siting context	B. In another part of regulatory process	a. Intrastate only	b. Interstate	a. Intrastate only	b. Interstate	3. Power pool	4. Electric reliability region	1. Economic and population growth trends single applicant's service area	2. Economic and population growth trends service area of each member of joint venture	3. Power demands broken into residential, commercial and industrial groups within service area	4. Assuming a made as to average number of household appliances	5. Demand projections: a. For applicant utility	5. Demand projections: b. For power pool in which utility is located	6. Possible savings from energy conservation measures	7. Use of alternative energy sources solar, geothermal or cogeneration	8. Potential for reducing peak power requirements: a. Peak load pricing	8. Potential for reducing peak power requirements: b. Load management	9. Elasticity of demand as rate structure or rate level changes	1. Phaseout of baseload oil gas facilities to be replaced by coal or nuclear facilities	2. Considering other planned additions to power pool generating capacity to reduce risk of excessive capacity for power pool	3. Power exchanges with other power pools mitigating need	4. Adverse impacts of [illegible] power pool on areas outside pool or region	5. Reserve margin	6. Aging and retirement of existing facilities	1. Availability and relative costs of alternative energy sources	2. Prospective trends in fuel costs	A. State utility commission staff	B. Other state agency	C. Electric reliability council	D. Utility	
ALABAMA	a				X		1b		1		2																									10
ARKANSAS					X		1	1	1	1	1																									10
ARIZONA	X	X			X	X[c]	1	1	1	1	1										3	3				2	1	1							X	10
CALIFORNIA	X	X	X		X		1		1		1										1	1					1	1			X			X	10-20
COLORADO					X		1		1										2													X		X	5-10, 8-20
CONNECTICUT					X		1	2	1	2	1										3		3											X	10	15-10 for certificate
DELAWARE					X		1	1	1	1	1										3	3	2											X	10	
FLORIDA	X				X		1	1	1	1	1										3	3	2											X	15	
GEORGIA						X[c]	1		d										2		2															
ILLINOIS					X		1	1	1	1	2	2									1	2	2	1		2								X	10	
INDIANA						X[e]	1		1																									X	10	15
IOWA	X			X	X		1	1	1	1	2	2																						X	15	
KANSAS					X		1	2	1	2	1	2									2	2	2	1	2	2	3	1	1	1	1	X				info of proposed facility
KENTUCKY					X		1	1	1	1	1										2	2			1	1								X	5-10	
LOUISIANA							f														3	3	3			1								X	10	
MAINE					X		1	2	1	2	2	2																								
MARYLAND					X		1	1	1	1	3	3									3	3	1	1			2	2	1	1	1					20
MASSACHUSETTS	X	X	X	X	X		1	1	1	1	1										1	1										X		X	10	
MICHIGAN						X[c]	1	1	1	1	1	2									3	3	3	1	1	1								X[g]	10	
MINNESOTA	X	X	X			X[h]	1	1	1	1	1	2									3	3	1	1	1	1								X	10	
MISSISSIPPI					X		1	2	1	2	2	2									3	2	1	1	1	1	1							X	15	
MISSOURI					X		1		1		2										3	3					2	1	1	1	1			X	10	
MONTANA	X				X		1	1	1	1	1	1	3	3	1	1	1	1	2		3	3	2	2	1	2								X	15-20	
NEBRASKA					X		1		1		1	1	1	1	1		1	1	1				3				1							X	20	
NEVADA					X		1	2	1		1	1	1	1	1	2	1	1	1		3	3	2	1	1		1							X	20	
NEW HAMPSHIRE	X	X			X		1	1	1	1	1	2	1	1	1		1	1	1		3	3				3	1							X	5-10	
NEW JERSEY					X		1	1	1	1	1		1	1	1	1	1	1	2		3	3	1	2	1	1	2							X	10	
NEW MEXICO					X		1	2	1	2	1	2	1	1	1	1	1	1	1		3	3	1	1	1	1	2							X	15	
NEW YORK					X	X[i]	1	1	1	1	1		1	1	1	1	1	1	1		1	1	1	1	2	1	2							X	10	
NORTH CAROLINA	X				X	X[i]	1	2	1	1	2	2	1	1	1	1	1	1	1		1	1	1	2	1	2	1							X	15	
NORTH DAKOTA						X[h]	1	1	1	1	2	2	2	2	1		1	1	2		1	1	1		1	1	1							X	15	
OHIO					X		1	2	1	2	1	1	1	1	1	1	1	1	1		1	1	1	2	2	2	1							X	10	
OKLAHOMA						X[c]	1	2	1	2	2	2	1	1	1		1	1	1		1	1	1	1	1	1	1							X	10	
OREGON	X				X		1		1		1		1	1	1		1	1	2		1	1	1	2	2	1	1							X	5-7	
PENNSYLVANIA						X[e]	1		1		1		1	1	1	1	1	1	2		1	1	1			1	1	3	1	1	1	1		X	20	
RHODE ISLAND						X[c]	1		1		1		1	1	1		1	1	1		2					1	2							X	10	
SOUTH CAROLINA					X	X[c]	1	1	1	1	1		1	1	1		1	1	2	2	2	2	3	1	1	1	1							XI	5	
TEXAS						X[h]	1	1	1	1	2		1	1	1		1	1	1		1	1	1	2		1	1							X	10	
TENNESSEE																			2				1	1	1	1	2							X	5-7	
VERMONT					X																															
VIRGINIA					X	X[i]	1	1	1	1	1	1	1	1	1	1	1	1	1	3	1	1	1	1	1	1	1							X	10	
WASHINGTON	X		X		X		1	1	1	1	1	2	1	1	1	1	1	1	2	2	3	3	2	1	1	1	1							X	10	
WISCONSIN	X		X		X	X[c]	1	1	1	1	1	1	1	1	1	1	1	1	1	2	3	3	1	1	1	1	1							XI	20	
WYOMING	X	X				X[h]	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	1	2	1	1	2[m]							X	20	
Percent % of States Giving the Factor Primary Consideration							100%	80%	98%	80%	80%	38%	94%	91%	83%	45%	91%	80%	57%	24%	33%	31%	43%	55%	67%	45%	11%	88%	79%	83%	95%					X	15	
Secondary Consideration							–	18%	–	18%	29%	30%	2%	2%	2%	10%	3%	12%	31%	29%	12%	17%	21%	17%	7%	17%	14%	9%	9%	5%	–						
– Under Study							–	–	–	–	3%	2%	2%	2%	5%	7%	–	2%	10%	10%	40%	33%	17%	–	2%	2%	5%	–	–	–	–						
No Consideration							–	21%	2%	24%	8%	30%	2%	5%	10%	38%	6%	26%	2%	37%	15%	19%	19%	28%	24%	36%	71%	3%	12%	12%	5%						
75% or More of States Give the Factor Primary Consideration							•		•				•	•	•		•											•	•	•	•					
50% or More of States Give the Factor Primary Consideration							••	••	••	••	••		••	••	••		••	••	••					••	••			••	••	••	••					

[a] A blank space means no/none/not applicable.

[b] Explanation of code:
"1" means the factor is a primary consideration;
"2" means the factor is a secondary consideration;
"3" means the factor is being studied and is presently not a consideration;
a blank space means the factor is not considered.

[c] Need must be justified when utility requests rate increase.

[d] Only 1 utility in entire State.

[e] Demand forecast considered at rate increase, a ancillary in granting rate increase.

[f] Demand forecasting not considered in a need for power context.

[g] Must be reviewed and approved by Energy Facilities Siting Council.

[h] Before siting phase of approval process.

[i] Overall statewide need considered annually.

[j] The power pool

[k] Although certification occurs before construction, the only real significance is that it is required before costs will be allowed for ratemaking purposes.

[l] Tennessee receives all its generating power from the Tennessee Valley Authority and plays no part in a need for power decision.

[m] In assessing service dependability, Commission staff place primary emphasis on measures of total generating system reliability and factors effecting reliability including projected demand, plant performance characteristics, voltage reductions capability, load shedding and load shifting capability, be capability etc., rather than using only reserve margin as a surrogate reliability measure. The staff incorporates these factors in a simulation model whose output is expressed in units of Mean Time Between Failure (MTBF), similar to Loss of Load Probability (LOLP).

[n] P.S.C. acts separately from siting decision (each conditioned on the other).

ATTACHMENT II

U.S. GENERAL ACCOUNTING OFFICE'S

TELEPHONE SURVEY OF STATE OVERSIGHT OF ELECTRIC

UTILITIES' MANAGEMENT PLANS AND PRACTICES

SUPPLIERS AND STATE
REGULATORY AGENCIES

1.(A) How much electricity was consumed in your State in 1978, or in the latest 12-month reporting period? How was that demand shared among the major customer groups?

Customers	Annual consumption (MWH) 1/
Industrial	_____
Residential	_____
Commercial	_____
Total	_____

(B) Who are the principal suppliers of electricity to your State, and what percentage of your State's retail load do they now (1978 or the latest 12-month reporting period) meet?

Investor-owned utilities	_____
Publicly-owned utilities 2/	_____
Federal agencies 3/	_____
Other suppliers 4/	_____
Total	100%

1/ Total consumption, including utilities and self-generation.

2/ Public utility districts, municipal utilities, rural electric cooperatives, others.

3/ Sales at retail (wholesale sales should be classified in other retail categories).

4/ Self-generation, such as private powerplants for industries or wind generators for farms or solar for residences.

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2. What are the principal State agencies responsible under the law for meeting the following electricity management duties?

	Responsible for Regulating		
	IOU's	POU's	Others
	(State agency name)		
-assuring that new powerplants and transmission facilities do not violate State and Federal environmental standards.			
-assuring that electricity demand forecasts are accurate and realistic.			
-assuring that the costs and the benefits of alternative methods of meeting future power needs are carefully evaluated and compared before capital investment (rate base) decisions are made.			
-assuring that cost-effective conservation programs and projects are implemented.			
-assuring that the potentials of renewable energy sources are developed.			
-assuring that power rates charged industrial, commercial, and residential customers are equitable, encourage conservation (and discourage waste), and include the appropriate costs of service.			
-exercising controls to minimize the impacts (including cost) of constructing powerplants and transmission/distribution facilities.			
-assuring the reliability of power supplies for residential, commerical, and industrial customers.			

APPENDIX I

-assuring adequate public and legislative participation in power system planning and policymaking.

(May we have copies of relevant State laws, regulations, and guidelines?)

3. What mechanisms exist to coordinate the decisionmaking authorities and actions for power supply planning? How effective are the mechanisms?

--among sub-State regions

--within the State

--among States

--within electric reliability region

--with various agencies of the Federal Government

4. On November 9, 1978, the President signed into law several energy-related Acts, known collectively as the National Energy Act. One of these Acts, the Public Utility Regulatory Policies Act, directly affects the State regulatory processes and policies governing electric utilities. Several standards, including rate design, are established for electric utilities in order to meet the three purposes of title I of the Act: to encourage conservation; to improve efficiency in the use of facilities and resources by electric utilities, and to encourage equitable rates to the consumers. In general, these standards are to be considered and acted upon (either favorably or unfavorably) by the State agencies responsible for approving utility practices, particularly rates to be charged consumers, within the next 3 years. What actions have you taken, or planned to take, to meet the three purposes of title I of the Act?

--conservation

--improved efficiency

--equitable rates

5. Are the State agencies, in total, adequately staffed and funded to meet their respective electricity management responsibilities?

(A) If so, is it likely that additional staffing and funding will be needed by these agencies for implementing the Public Utility Regulatory Policies Act of 1978?

(B) If not, in what areas are shortages in staffing and funding most seriously limiting the effectiveness of State agencies?

What actions are planned to deal with these shortages?

(C) Approximately what level of resources does the State presently devote to electrical energy regulation and planning? (PUC, energy policy office, siting council, etc.)

--annual funding and source (energy-surcharge, Federal grants, State appropriations, etc.)

--full-time administrative, technical, and professional positions

--equivalent positions for part-time experts and consultants

(D) How is information on electric energy planning and regulatory programs given to the public (including government agencies--Federal, State, and local)?

--annual reports

--periodic progress reports

--public hearings

--others

6. (A) How do other State agencies' goals and programs significantly impact on utility power supply plans and planning practices?

--Economic Development

--Land Use

--Environmental Quality

--Consumer Protection

--Other

(B) Have State and local environmental and land-use standards or enforcement policies been relaxed somewhat for non-conventional (solar, cogeneration, geothermal, etc.) or decentralized power supply alternatives, or is it as difficult, based on the State's experience to build, for example, a low-head hydro plant or initiate a conservation program as it is to build a large central station thermal plant?

7. Have public hearings and other communication forums been established to encourage citizen participation in planning the State's electrical energy future? If so, where are such hearings held, how often, and by whom?

What important planning issues have surfaced?

Have debates about how best to resolve these issues been documented in hearings or reports?

EVALUATING UTILITY DEMAND FORECASTS

8. (A) What are the principal demand forecasting techniques used by the electric utilities which you regulate?

--Qualitative techniques (use expert opinion; may not use historical data) e.g., Delphi method.

--Time-series analysis and projection methods (use statistical methods to make qualitative forecasts based on patterns or changes in patterns measured in historical data), e.g., trend projections.

--Causal methods (obtain information, particularly relationships among system elements; relies on historical data), e.g., econometric models; end-use models.

(B) Do the utilities' forecasts contain explicit assumptions about how demand for electricity will be affected by (1) substitute energy sources (cross-elasticity of supply), (2) price variation (elasticity of demand), or (3) conservation programs (demand modification)?

(C) (1) What is the existing reserve margin in your State?

(2) What reserve margin (percentage) is being planned for the future, e.g., 2000 A.D.?

9.(A) In view of the uncertainties in demand forecasts, it would seem appropriate for electric utilities to develop a range of forecasts (e.g., high, most likely, low) so that power supply plans could be evaluated over a range of possible future situations. Do the utilities you regulate prepare and submit forecasts in this manner? If not, why not?

(B) Has the responsible State agency or another organization (government, private, environmental, consumer, public interest group, etc.) prepared independent forecasts for use in your proceedings?

(1) If so, how were these studies used and to what effect (i.e., to what extent were utility power supply plans adjusted as a result of these independent forecasts)? Can we secure representative copies?

(2) If not used, why not?

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10. Which State or local government agencies (home rule cities, counties, etc.) are ultimately responsible for evaluating (or approving) utilities' demand forecasts?

11. What evaluation techniques are used in your State?

--prepare independent forecast (or contract for same).

--analyze and evaluate utilities' forecasts by validating the key assumptions and demographic/ economic data.

--develop forecasting methodologies or guidelines for electric utilities to use in developing their forecasts.

12.(A) How have the utilities' forecasts (peak load and average energy load) as of January, 1975, compared to the actual loads that occurred?

	Actual (MW)		Forecast (MW)	
	Peak Load	Average Energy Load	Peak Load	Average Energy Load
1976				
1977				
1978				

(B) Where significant variances occurred, what were the principal factors causing them (e.g., unanticipated weather conditions, erroneous growth assumptions, unexpected pricing changes, voluntary conservation efforts, etc.)?

(C) Have forecasting procedures been adjusted, where appropriate, to assure that these factors are thoroughly considered in future forecasts? How?

13. How do State forecasts or analyses compare to the utilities' forecasts:

(A) for the next 10 year period? What accounts for the differences, if any?

--different assumptions

--different methodologies

--other

(B) for the next 20 year period? What accounts for the differences, if any?

--different assumptions

--different methodologies

--other

14. How and by whom are State growth assumptions set for electricity demand forecasting purposes?

--population

--economic activity

--per capita power consumption

--price-demand elasticity

15. Are the following State plans or goals incorporated into the assumptions used for electricity demand forecasts upon which State rate approval is based?

--economic development plans

--land use plans or goals

--energy conservation plans or goals

--environmental plans or goals:
-air

-water

-coastal zone

-housing

-other

AUTHORIZING NEW POWER SUPPLIES

16.(A) In a national survey, published in March 1978 by the Nuclear Regulatory Commission, "Need for Power: Determinants in the State Decisionmaking Processes," the responsibilities and criteria for deciding "need for power" in your State were described. Is that description accurate today? (See responses from States that resulted in attachment I of appendix I.)

(B) In the last 3 years what important public issues and management concerns have impacted most on State decisions of how best to secure new power supplies?

For example:

Yes No

--What rate of load growth is likely for the 1980s?
--Which fuel sources are least likely to be interrupted?
--What opportunities exist for exchanges and purchase agreements with other utilities?
--Will fossil fuels or nuclear plants prove more economical on an electric power supply (life-cycle) basis?
--Which power supply options are most acceptable to the general public?
--What are the long-term social and environmental impacts of alternative power supply options?
--How soon will renewable energy technologies be technologically feasible and economically practicable?
--Can the continuing cost escalation in thermal plant construction be slowed or stopped?
--Can the responsible Government and utility officials satisfactorily deal with nuclear waste and fuel reprocessing problems?
--Other

APPENDIX I

PLANNING FOR CONSERVATION AND LOAD MANAGEMENT

17. (A) What are the primary incentives or sanctions the State uses, if any, to encourage utilities to explore conservation and load management options (rates of return, etc.)?

What are the predominant types of conservation and load management proposals that have been submitted or implemented by the electric utilities in the past 3 years?

(B) Does the State view this as satisfactory progress?

18. (A) Are declining block rates or other promotional pricing structures used by the utilities which you regulate? Are utility rates based on average cost pricing? If not, what pricing system(s) is used, such as marginal cost, etc?

(B) Does the State agency have the authority to require utilities to study and to implement cost-effective conservation and load management practices? Has this authority been exercised in the last 3 years and, if so, what are the principal reasons for the State's actions?

PLANNING FOR COGENERATION AND POWER EXCHANGES

19. (A) What are the primary incentives or sanctions the State uses, if any, to encourage utilities to consider cogeneration projects and contracts/exchanges/interties with other utilities or industries in lieu of building conventional powerplants?

What are the predominant types of such projects that the electric utilities have submitted for approval or implemented in the last 3 years?

(B) Does the State view this as satisfactory progress?

(C) Does the State agency have the authority to require utilities to study and implement cost-effective cogeneration and power exchanges? Has this authority been exercised and, if so, what were the principal reasons for the State's action?

PLANNING FOR RENEWABLE RESOURCES

20.(A) What are the primary incentives or sanctions the State uses, if any, to encourage utilities to use renewable resources and to consider non-conventional technologies, such as low-head hydro, wind, geothermal, biomass, or solar heating/cooling systems, in lieu of building conventional powerplants?

What are the predominant types of non-conventional, renewable resource projects that the electric utilities have submitted for approval or implemented in the last 3 years?

(B) Does the State view this as satisfactory progress?

(C) Does the State agency have the authority to require utilities to study and to implement cost-effective renewable resource projects? Has this authority been exercised? If so, what were the principal reasons for the State's action?

FEDERAL ROLE IN ELECTRIC UTILITY PLANNING

21.(A) What has the U.S. Department of Energy done to assist your State in evaluating and improving the quality of electric utility plans and planning/management practices?

--grants

--information services

--technical assistance

--other

(B) Have any other Federal agencies, such as NRC, been of assistance?

22. In the last 3 years, have any of the Federal energy regulators (NRC, ERA, FERC) acted to prevent or delay construction of a conventional (nuclear, gas, coal, oil, hydro) powerplant because utility plans or planning practices were inadequate? On what grounds? Before or after State approval of the proposed plant? What was the result of the Federal action?

23.(A) What more could Federal agencies be doing to help State regulators and private sector decisionmakers improve the quality of electricity management? (e.g., is more Federal assistance needed at the State or regional level for forecasting and assessment of power supply/demand options?)

(B) Does your State want any assistance from the Federal energy agencies, such as DOE?

Are there any specific areas where, in your opinion

--new Federal programs or services should be started?

--existing programs or services should be improved?

--existing programs or services should be terminated?

POWER SUPPLIES PLANNED
BY UTILITIES

24. Based on your knowledge of the current plans of the utilities providing electricity in and to your State, please estimate how electrical demand loads in your State will be met in 1980, 1990, and 2000. (See next page).

APPENDIX I

(in percentage)	Techniques for meeting utilities forecast loads in 1980 Peak	1980 Average energy	1990 Peak	1990 Average energy	2000 Peak	2000 Average energy
A. Conventional power plants (coal, nuclear, conventional hydro, and gas or oil fired)	-	-	-	-	-	-
B. Cogeneration projects	-	-	-	-	-	-
C. Non-conventional generation and displacement (low-head hydro, biomass, geothermal, wind, solar, etc.)	-	-	-	-	-	-
D. Exchanges and purchase agreements with other utilities	-	-	-	-	-	-
E. Electricity conservation programs (eliminating waste)	-	-	-	-	-	-
F. Load management techniques and rate reforms	-	-	-	-	-	-
G. Other sources	-	-	-	-	-	-
	100%	100%	100%	100%	100%	100%

25. What percent of the power expected from new conventional powerplants built in your State will go to your State and how much to other States? How is the "need for a facility" question addressed when all or part of the output of the proposed generating facility in your State will be allocated to meet loads outside of the State?

APPENDIX I

26.(A) What types of investment options, such as those listed in enclosure 2 (production improvements, load control devices, cogeneration projects, low-head hydro, solar, and geothermal) are the electric utilities you regulate not allowed to add to their rate bases?

(B) In short, are the utilities able to earn as much money for their shareholders on non-conventional investments as they are on more conventional investments? If not, why not?

(C) Is it more difficult for electric utilities in your State to raise capital for investments in non-conventional projects than for investments in conventional generating plants? If so, why?

(D) Are the earnings of electric utilities regulated to reflect how good or poor a job they do in balancing power supply/demand at the lowest economic, environmental, and social costs? For example, would a utility that invested in very efficient conservation and cogeneration programs be allowed a higher rate of return on its investments (i.e., those with higher economic, environmental, and social costs per Kwh generated or conserved)? If not, why not?

Please provide information on actions taken to study and implement the following alternatives to new conventional power plants for balancing supply and demand.

Alternative	Have any studies of the statewide potential been made?	Who sponsored the studies (State, Federal, utilities, other)?	How significant are the identified potentials through the year 2000 in megawatts?	What actions have been taken to assure that the potentials identified in the studies have been factored into power supply planning?	Has any significant energy potential not been realized or addressed because of constraints (real or perceived) by Federal or State policy, law, or regulation?
A. Production improvements					
1. Raising dams					
2. Adding generators to existing powerplants or dams and waterways					
3. Installing more efficient generators/ transformers					
4. Reducing transmission and distribution losses					
5. Other					
B. Grid developments					
1. Interties					
2. Pooling					
3. Exchange agreements					
4. Other					

APPENDIX I

Alternative	Have any studies of the statewide potential been made?	Who sponsored the studies (State, Federal, utilities, other)?	How significant are the identified potentials through the year 2000 in megawatts?	What actions have been taken to assure that the potentials identified in the studies have been factored into power supply planning?	Has any significant energy potential not been realized or addressed because of constraints (real or perceived) by Federal or State policy, law, or regulation?
C. Conservation initiatives [a/]					
1. Information programs					
2. Loan programs					
3. Pricing changes					
4. Energy audits					
5. Other					
D. Pricing and rate structures					
1. Seasonal pricing					
2. Time-of-day pricing					
3. Elimination of declining block rates					
4. Inverted rate structures					
5. Replacement cost pricing					
6. Other					

a/ Residential, commercial, or industrial.

APPENDIX I

Alternative	Have any studies of the statewide potential been made?	Who sponsored the studies (State, Federal, utilities, other)?	How significant are the identified potentials through the year 2000 in megawatts?	What actions have been taken to assure that the potentials identified in the studies have been factored into power supply planning?	Has any significant energy potential not been realized or addressed because of constraints (real or perceived) by Federal or State policy, law, or regulation?
E. Load control devices					
F. Cogeneration projects 1. With industry 2. With municipalities 3. Other					
G. Low-head hydro					
H. Pumped storage					

APPENDIX I

Alternative	Have any studies of the statewide potential been made?	Who sponsored the studies (State, Federal, utilities, other)?	How significant are the identified potentials through the year 2000 in megawatts?	What actions have been taken to assure that the potentials identified in the studies have been factored into power supply planning?	Has any significant energy potential not been realized or addressed because of constraints (real or perceived) by Federal or State policy, law, or regulation?
I. Solar 1. Wind 2. Space or water heating/cooling 3. Photovoltaic 4. Biomass 5. Other					
J. Geothermal					
K. Other					

APPENDIX I

APPENDIX II

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

JUN 9 1980

Mr. J. Dexter Peach, Director
Energy and Minerals Division
U. S. General Accounting Office
Washington, D. C. 20548

Dear Mr. Peach:

We have reviewed the Draft of a Proposed Report, "Federal Actions Could Help Improve Electric Power Planning and Decision-Making." We endorse the recommendation to the Secretary of Energy to establish in the Economic Regulatory Administration (ERA) a responsibility center to coordinate all DOE efforts relating to improving electric power planning and to develop a comprehensive electricity program at the Federal level. We further endorse the recommendation that the Nuclear Regulatory Commission (NRC) "use as a guide the information developed by ERA's electricity program" and that we keep ERA informed of our agency's needs for analysis in this area. In this regard, the Commission occasionally reviews staff treatment of issues such as the need for power and, as a result, the level and type of review that the staff conducts could be modified in the future.

The GAO recommendation is generally in keeping with the NRC staff's current practice in determining the need for power. We use electricity demand forecasts from recognized sources and compare these with our own forecasts to arrive at an estimate of when new facilities are needed to ensure a reliable supply of electric energy. We expect that the program envisioned for ERA will be a major information source for our need for power assessments, provided that it takes into account, where appropriate, the beneficial aspects of replacing old high operating cost units.

The discussion on page 42 is generally a good characterization of NRC need for power evaluation, except that it is more accurate to describe our current practice as preparing an independent forecast in each case, relying on a number of sources, as described above.

Thank you for the opportunity to comment on the proposed report.

Sincerely,

William J. Dircks
Acting Executive Director
for Operations

(See GAO note, p. 174.)

APPENDIX III

National Governors' Association

Otis R. Bowen, M.D.

Stephen B. Farber

June 19, 1980

Mr. J. Dexter Peach
Director
Energy and Minerals Division
U. S. General Accounting Office
Washington, D. C. 20548

Dear Mr. Peach:

Thank you for the opportunity to comment on the draft report, "Federal Actions Could Help Improve Electric Power Planning and Decision Making." While we do not have specific comments, we do have some general ones which might be helpful in setting the framework for the report.

The finding cited in the report that few states have developed sufficient analytical capabilities to validate projection of electricity needs made by utilities is a problem which the states have been attempting to solve. In July 1977, the Governors recommended to President Carter that the existing state energy programs be consolidated and broadened to include financial assistance to assist states in developing a comprehensive energy management capacity. This management capacity included the ability to project the need for electric power generating facilities and for other major energy supply facilities. The legislation to provide such assistance is pending in the Congress. Once the financial assistance is provided, states will be able to develop the desired analytical capabilities.

The findings in the draft report make a strong case for the need for financial assistance to the states in the area of forecasting. It is essential that the report go beyond its emphasis on the provision of technical assistance to the states and clearly support federal financial assistance to states to develop forecasting expertise. Without such resources, states cannot hire the necessary staff to undertake forecasting activities. Without this basic staff capacity at the state level, the proposed technical assistance may well be useless.

In providing this financial assistance, the federal government should give states broad discretion to develop forecasting methodologies to fit their individual needs and situations. At this point, it may make sense to

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APPENDIX III

monitor and study the states' activities in this area. However, your recommendation that DOE develop monitoring capabilities within the DOE regional offices seems premature since there is not presently a high level of activity in the states.

If you have any questions regarding these comments, please contact Donnie Laughlin of my staff at 624-5374.

Sincerely,

Edward A. Helme

Edward A. Helme
Director
Energy and Natural Resources Program

APPENDIX IV

DEPARTMENT OF AGRICULTURE
OFFICE OF THE SECRETARY
WASHINGTON, D. C. 20250

JUN 25 1980

Mr. Henry Eschwege
Director
Community and Economic Development
Division
U. S. General Accounting Office
Washington, D. C. 20508

Dear Mr. Eschwege:

This is in response to your request of May 14, 1980, for comments from the Department and the Rural Electrification Administration (REA) on the draft report to the Congress entitled "Federal Actions Could Help Improve Electric Power Planning and Decision-Making."

The report concludes "that the Secretary (Department of Energy) should be taking actions to assure that the Nation's need for electric power is met at the lowest economic, environmental and social cost, and in a manner consistent with national energy policies." The goal of the recommended action is irrefutable; the recommendation to inject a Federal presence as proposed is, however, extremely controversial.

We note from the report that the General Accounting Office is preparing two separate studies which, we believe, are of equal importance. They are (1) Costs of Federal Regulation on the Electric Utility Industry, and (2) The Impact of Delays and Cancellations of Electricity Generating Plants. These studies, we believe, will bear as directly on the planning dilemma of the electric utility industry as the problem examined in this report. It is recommended that any conclusive recommendation be withheld until these studies are completed and analyzed in order to give proper weight to all relevant factors.

REA, in the conduct of its responsibilities and, as required by law, performs many of the functions outlined in the report. All proposed major power supply projects involving REA financial assistance require the completion of an extensive Environmental Impact Statement process which permits comprehensive public participation in the decision-making process. The Environmental Impact Statement addresses such issues, among others, as to the need for and the alternatives to the proposed project. This process, for major power supply projects, generally requires 2 to 3 years to complete.

REA disagrees with the conclusion that it "limitedly evaluates a cooperative's demand forecast before approving financing for a generating facility." Enclosed are copies of the present REA Bulletins 120-1 and 145-1 and Staff Instruction 120-1

that pertain to power requirement studies and forecasts. In addition, REA has two separate studies underway, one with the Electric Power Research Institute and the other with the Oak Ridge Laboratory. The studies will review load forecasting technologies and methodologies, comparisons of such with REA procedures, and recommendations for future applications. In addition, REA is active in its relationship with borrowers in their concerns and development of procedures and systems regarding load and supervisory control, energy management systems, and operation, preventive and quality management. We are presently undertaking, through outside consultants, in-depth studies of Supplemental and Alternative Generation Technologies for REA Financed Programs and Methodology for identifying Environmental Constraints in Power Plant Siting.

REA has with the advent of the energy crisis, both as to availability and cost, instituted a policy requiring borrowers to have an effective energy conservation program for continued REA financing. We are initiating through the Federal rulemaking procedure a program which will enable borrowers to delay certain principal payments on outstanding REA loans to provide them with funds to lend to consumers. The consumer loans would be for energy conservation related improvements and modifications on existing residences and public buildings.

A March 1980 reorganization of the REA electric program staff resulted in a separate division devoted to the development by borrowers of supplemental and renewable energy projects. While this program is still in its infancy, borrower interest indicates a substantial number of projects will be forthcoming shortly.

More detailed comments on the report are as follows:

- We basically agree with the statement on page 15 that "demand forecasts are the critical starting point in determining whether additional capital investments should be made to meet future growth in demand." Forecasting is, however, more of an art than a science. Enlargement of the data base sufficient to make the forecast more reliable is certainly necessary.

- On page 15, 250,000 MW of capacity at a cost of $500 billion is equated to about $6,500 of investment for each household. Nationally electric sales to residential consumers are only approximately one-third of all electric sales. A better perspective would be to equate the cost to approximately $4,200 per household, $2,000 per industrial user and $2,200 for each other type customers.

- On page 27, regarding load management, recognition needs to be paid to the consequences of over flattening the load curve. Carried to extremes a system could experience serious maintenance and reliability problems.

- The report is critical of the States' efforts to encourage alternative energy sources. Only one State allowed a utility a greater rate of return on investments on renewable energy sources than on conventional facilities. This is not a healthy situation and the States should be encouraged to adapt their practices in line with the new energy reality.

- Until the 1970's, with the rapid change in the energy scenario, consumer activism, licensing requirements, inflationary impacts and productivity losses occurred, the utilities record of matching new facilities with electric demands was creditable. Recognition of this fact should be made in the report.

- The report discusses cost penalties of over capacity; no mention is made of cost or social consequences of inadequate capacity. A scenario of a major city or region blackout and general economic and social impacts because of electric capacity or energy restrictions should be explored.

- The Regional Reliability Councils' (FERC-DOE) have some capacity-demand overview functions. This should be acknowledged in the report.

Electric load demands are influenced by consumers rather than by suppliers. We believe the most responsible scenario of planning and decision-making for power producing and transmitting facilities to meet that demand is to leave such to the responsibility of the entities that must be responsible for the end result. We agree that in this process consumers and local, State, and Federal Governments must be involved to a significant degree.

What has happened in recent years, however, just when the demand characteristics have become more uncertain -- is to place upon an operating electric utility increasing burdens which only tend to increase the lead time involved in building a power plant. At the very time the future outlook has become more cloudy, the utility is being required to look further into the future. Placing additional regulatory responsibilities on the utilities will only increase the possibility that the capacity versus demand equation will become more imbalanced.

This is not to imply that forecasting techniques cannot be improved -- they can. Smaller increments of generation, preferably with renewable resources as the energy source, should be utilized where possible. Conservation should be encouraged in every way possible. In this way, fewer new conventional generating plants will be needed. For the ones that are needed, however, an effort should be made to shorten the time to plan and build those plants. The central recommendation of this report that the Federal Government become involved directly in the decision-making process of when and how to build these plants would, in our opinion, only lengthen that lead time and exacerbate the problem, not solve it.

Sincerely,

Secretary
Enclosures

APPENDIX V

Department of Energy
Washington, D.C. 20585

JUN 19 1980

Mr. J. Dexter Peach
Energy and Minerals Division
U.S. General Accounting Office
Washington, D.C. 20548

Dear Mr. Peach:

We appreciate the opportunity to review and comment on the General Accounting Office (GAO) draft report entitled 'Federal Actions Could Help Improve Electric Power Planning and Decision-Making." The Department of Energy (DOE) is actively pursuing a wide range of initiatives which we believe will lead to greater efficiency in planning in the electric utility industry and, thus, is very much interested in the result of this GAO study.

We would first like to commend the GAO for its comprehensive examination of a complex subject area. Based on our review of the draft report, we offer the following comments which we believe will enhance the accuracy and usefulness of the final report.

A stated objective of this draft report is to ensure that national energy interests are adequately considered in utility decision making. The report recommends that DOE, through its Economic Regulatory Administration (ERA) and in cooperation with the States, enhance its capabilities to develop and evaluate power supply planning options independently. However, it should be emphasized that the primary responsibility for planning, development, and operation of the Nation's power system must continue to be with the utility industry. Hence, the real challenge is to assure that utilities carefully consider and develop needed improvements in bulk supply system designs and operations. Regulatory agencies should assist the utility planning process to ensure consideration of all reasonable proposals and determine that those adopted are comprehensive and consistent with the public interest. The primary function of Federal and State agencies should be to monitor and motivate, not displace the planning and design responsibilities of the Nation's utilities.

APPENDIX V

DOE is currently performing, at least in part, many of the actions recommended for improving utility planning. The ERA, on a continuing basis, promotes improved industry planning procedures through its extensive efforts with the National Flectric Reliability Councils (NERC), as well as through technical assistance to States and individual utilities in the resolution of power supply problems. ERA also develops national and regional projections of electric energy consumption, peak loads, installed generating capacity and fuel consumption based on data and plans submitted by utilities, regional reliability councils and State agencies. ERA also provides independent assessments of utility forecasts of electric power supply and demand for summer and winter peak periods. In addition to these activities, several other current efforts by ERA are particularly pertinent to the topics discussed in this draft:

- Publication of a comprehensive assessment of electric power supply and demand for the 1980-1990 time frame.
- Implementation of several recommendations of the National Power Grid Study relating to improving system's coordination.
- Publication of a voluntary Public Utility Regulatory Policies Act (PURPA) guideline designed to eliminate barriers to greater use of solar energy and renewable resources by utility customers.
- Administration of the innovative rates and basic grant programs which provide the regulatory and utility communities with funding and technical assistance to further PURPA-related activities and the achievement of national energy goals.
- Support of studies to develop load forecasting and other analytical techniques for State commissions and small utilities with limited staff and expertise in this area.
- Preparation of the National Electric Reliability Study mandated by Section 209 of PURPA, the results of which will address the topics discussed in the draft report and should provide guidance for future initiatives.
- Development of several in-house models to evaluate various electric system expansion scenarios for power system plans and operations.
- Extensive involvement in Federal Energy Regulatory Commission rulemakings related to cogeneration and renewable resources.
- Publication of a study entitled "ELFOR (Electric Load Forecasting)--A model for Long-Range Forecasting of Electric Energy (KWH) and Demand (KW) and for Load Management Simulation."

The draft report recommends a significant expansion of DOE involvement in the utilities area for which the existing legal authorities are questionable. Of particular relevance to the utility system planning recommendations in the draft report are the following DOE authorities:

- The authority to provide technical assistance in regulatory reform matters, as directed by Section 132 of PURPA.
- The authority to intervene before State agencies in utility regulatory proceedings to advocate national energy policy, as provided in Sections 121 and 305 of PURPA.
- The authority to prescribe voluntary guidelines for ratemaking and regulatory issues, including load management and time-of-day rates, as directed by Section 131 of PURPA.
- The authority to conduct need for power reviews for nuclear plant environmental impact statements and perform DOE reviews of utility plans to assure adequate and reliable bulk power supply as provided by the Atomic Energy Act and Section 202(a) of the Federal Power Act, respectively.
- The authority to perform a study on electric system reliability and standards and implementation of the recommendations of the report, as mandated by Section 209 of PURPA.

Although the above-listed authorities touch upon many of the areas discussed in the draft GAO report, there does not now exist in DOE the necessary legislative authority to carry out the comprehensive electric utility system planning initiatives contemplated by the report. In addition, our preliminary assessment of the draft recommendations indicates that there would be a need for significant expansion of headquarters and regional staff of the ERA. We suggest, therefore, that the GAO report address the need for additional legislative mandate and resources to initiate and implement the GAO draft recommendations.

The issue of legislative authority is especially important since utilties have historically resisted Federal intervention, particularly in the areas of system planning and forecasting. The industry has traditionally been reluctant to provide Federal agencies with the type of data that would be needed to support the Federal analytical and planning efforts recommended in the draft report.

We also believe that the report should more fully explore alternative ways of achieving the needed level of industry cooperation in data gathering and analytical activities. More extensive utility input should be solicited and incorporated into final decisions and recommendations resulting from the draft report. We note that several national utility organizations were asked to comment on the draft report; however, we believe that the structure of these organizations makes it difficult

for them to represent the positions of individual utilities in such areas as planning and operation. Greater input form State regulatory agencies should also be solicited with particular reference to data gathering problems and securing cooperation.

In addition to the above comments, a more detailed set of page-by-page comments were provided directly to your audit staff.

We appreciate your consideration of these comments in the preparation of the final report and will be pleased to provide any additional information you may desire in this matter.

Sincerely,

Jack E. Hobbs
Controller

APPENDIX VI

JACK L. SCHENCK Vice President

EDISON ELECTRIC INSTITUTE The association of electric companies

1111 19th Street, N.W.
Washington, D.C. 20036
Tel. (202) 828-7400

June 19, 1980

Mr. J. Dexter Peach
Director
Energy and Minerals Division
United States General
Accounting Office
Washington, D.C. 20548

Dear Mr. Peach:

EEI has reviewed the GAO draft of the proposed report entitled "Federal Actions Could Help Improve Electric Power Planning and Decision Making." Attached are our general and specific comments on the report. Also, we raise a general concern regarding extensive federal involvement in utility planning.

Utilities recognize the need for prudent electric planning which incorporates an ever-changing and expanding array of criteria. In particular, they recognize that the ability to deal with uncertainty has taken on critical importance. That is why the Electric Power Research Institute has pioneered work in this area and is actively diffusing the results of its research among utilities. A copy of EPRI's report, "Costs and Benefits of Over/Under Capacity in Electric Powr System Planning" is also attached.

It is inconceivable that any organization other than an electric utility has the wealth of data, trained personnel or practical experience necessary to carry out proper planning. Developing this kind of expertise within the federal government would be an unnecessary expenditure of taxpayers' money. In addition, the burden to electric utilities imposed by such federal actions would be significant.

We appreciate the opportunity to comment on the report in draft form. For further information or discussion, please contact Fred Denny, EEI's Director of Engineering, at (202) 828-7466.

Sincerely yours,

Jack L. Schenck

Attachments
cc: D. Bauer
F. Denny
P. Greiner
B. Hardy
J. Kearney
J. Karp
C. Robart

APPENDIX VI

EEI COMMENTS ON GAO DRAFT ENTITLED
"FEDERAL ACTIONS COULD HELP IMPROVE
ELECTRIC POWER PLANNING AND DECISION MAKING

General Comment

The criticism leveled at electric utility planning and forecasting by the GAO draft fails to acknowledge the true nature of the problem utilities face. The problem is not that utilities (and states) lack the best techniques for forecasting. These techniques are already being (or can easily be) adopted.

Rather, the challenge confronting both power companies and state governments is handling the uncertainty in our society and economy that is being created by Federal indecision or frequent reversals of policy.

To make reasonably accurate estimates of future electricity requirements demands above all some idea of what GNP growth will be and whether it will be consumption or investment oriented. This is of paramount importance as an exogenous variable. Yet, this variable reflects the overall economic policy of the federal government and the latters inability to come to grips with the question makes utility forecasting something that must be done with wide bands of uncertainty since on average, electricity requirements will grow at 1.25 to 1.3 times GNP growth. Thus, an indecisive federal policy resulting in only a 2% per annum GNP increase would mean electricity use growing at 2.5% or 2.6% per year nationwide. However, a vigorous policy by government seeking to encourage investment could generate GNP increases of over 3% per year meaning electricity consumption rising by over 4% yearly. The 1½% differential when compounded over the planning and building lead time of a major power facility could mean a total requirement differential of up to 20%, or 200,000 MW by the mid-1990's.

Planning is indeed of crucial importance to the consumer, but what is needed from the Federal government is greater coherence and planning in its own activities, not further involvement in state and local affairs. By reducing the uncertainty in the input it represents, government will be able to decrease uncertainty significantly at the company and state levels.

Unfortunately, the report ignores this crucial consideration and instead seeks to suggests that the problem resides with utilities and states who do not employ sophisticated methodologies. It further suggests that sophistication requires federal involvement. Neither contention is accurate. To the contrary, utilities have taken the lead in developing techniques to deal with the generic uncertainty that accompanies the greater federal role in energy. A prime example is work sponsored by the Electric Power Research Institute (EPRI) under its Over/Under Capacity project. The results of this pioneering methodology development are now being actively transferred to the investor and non-investor utility sectors.

APPENDIX VI

EEI COMMENTS ON GAO DRAFT OF A PROPOSED REPORT ENTITLED FEDERAL ACTIONS COULD HELP IMPROVE ELECTRIC POWER PLANNING AND DECISION MAKING

Specific Comments - Digest

1. Regarding the implied relationship between plans for the construction of power plants to meet load growth requirements through the year 2000 and the effect of conservation and renewable rescurces (Digest p. i, Body p. 1)

   COMMENT: We would agree with the statement that electrical load may be expected to greatly increase through the year 2000. EEI anticipates that it will be necessary for the industry to construct power plants which will supply enough power to keep pace with a national electrical load growth rate of 2 to 5.1% per year over the next twenty years. We would point out that even under the most optimistic scenarios, conservation and renewable resource alternatives will provide little help, certainly not more than 5 to 10 percent of the total requirement.

2. Regarding the statement that "state regulatory agencies and electrical utilities are ill-equipped to deal with power planning challenges" (Digest p. i, Body p. 31 and Appendix I)

   COMMENT: We would strongly disagree with this statement. Electric utilities have extensive experience with planning and forecasting and have developed a very high level of expertise.

3. Regarding the statement to the effect that there is uneveness of depth and approach in electric utility planning among states and utilities (Digest p. i, Body p. 3 and p. 19)

   COMMENT: We believe that there are good reasons why this is desirable. Utilities have great diversity in terms of load, geography, generation fuel mix, financial and environmental considerations, regulatory climate, etc. The planning methods chosen by the utilities closely reflect the characteristics of their individual systems. To insure the use of the most current planning methods, utilities continuously exchange information concerning the applicability of various planning approaches in committees of EEI, EPRI and NERC.

....

4. Regarding the statement that "most states lack assurance that...conservation, load management, cogeneration and renewable resources are thoroughly studied and implemented when more cost effective..." (Digest p. i, Body pp. 25-31)

   COMMENT: We disagree with this statement because we believe that utility membership in EEI and EPRI provides a basis for assurance that these options are being thoroughly studied. Utilities implement those programs that are proven to be cost effective.

5. Regarding the statement that "utilities currently have little positive economic or regulatory incentive to promote...cogeneration, conservation, load management, and renewable resources" (Digest p. ii, Body p. 31)

   COMMENT: We would agree that the existing regulatory incentives to promote these options are less than cogent. However, we would argue that the decision to pursue these options should be made on the basis of realistic cost justification and technical feasibility. Regulatory incentives may distort decision making by providing artificial or changeable goals.

6. Regarding the need for "Federal guidance to meet identified planning needs at state, regional and utility levels" (Digest p. iii, Body pp. 45-50)

   COMMENT: We would disagree with the need for Federal guidance of this type. A Federal program for this purpose would involve unnecessary government spending and, in our judgment, provide little or no benefit.

7. Regarding the need for Federal oversight to improve the quality and usefulness of plans and practices (p. 47)

   COMMENT: The need for "improving the quality of plans" through Federal oversight is not established by the report.

....

APPENDIX VI

8. Regarding the need for Federal oversight to provide for a more open and participative approach (Digest p. 47)

   COMMENT: Electric utilities currently take a very open approach to planning and forecasting. We would question the value of increased public participation in the process of forecasting and planning. These processes are by their nature very complex and it is doubtful if the public could contribute in any useful manner.

9. Regarding the need for a DOE/ERA power planning manual (Digest p. iv)

   COMMENT: The need for such a manual is not justified by the report. Electric utilities are able to obtain the information needed for effective planning through existing industry associations.

APPENDIX VI

EEI COMMENTS ON THE DRAFT ENTITLED
"FEDERAL ACTIONS COULD HELP IMPROVE
ELECTRIC POWER PLANNING AND DECISION MAKING

Specific Comments - Text

Page 1 - It should be noted that the 1979 NERC ten-year forecast has been revised downward considerably. Preliminary 1980 figures show only a 4.1% growth through 1989, which incidentally, compares with the 1978 forecast of 5.3%.

Scores of utilities contribute to the NERC aggregate projection which means that perceptions of change have taken time, but the modification process should be nearly complete. Underestimation may soon be a danger.

Page 4 - The NRC's "need for power" evaluation would seem to satisfy the suggestion on Digest page iv.

Page 9 - 9 The government's role in generating uncertainty is highlighted by the statements at the bottom of page 9 and top of page 9.

Page 9 - The 1974 recession was not a minor one. Since that recession, electricity growth has dropped considerably but so has GNP growth. Since electricity growth depends on economic growth to a sizeable extent, Kwh growth has been influenced by the sluggish economy.

Page 14 - The energy growth outlined here is in keeping with the results of the new EEI Study, Economic Growth in the Future (copy enclosed). It sees energy growing at between 1.4 and 1.9% a year depending on whether we experience a continuation of present government policies or adoption of measures more conducive to investment and productivity growth.

Page 15 - The dollar figures cited on this page have been interpreted in a distorted manner.

First, $500 billion is considerably more than the amount needed to complete plant scheduled for 1988 service. Some of the total would be for facilities due in service in the 1990's.

Second, only about 65% of the appropriate figure would be for production plant. T&D investment would be required even if electricity growth were reduced, in part to handle the growth in numbers of customers and in part to better line systems together in order to take advantage of increased power exchange associated with attempts to reduce reserve margins.

Page 16 - (Con't) Third, the $6,500/household figure is misleading for the same reasons as the total.

To suggest that 55,000 MW of capacity represents over $100 billion by 1988 ignores the fact that not all investment would be in generation plant.

Finally, the investment per household figures would be spread over ten years. At $1,300 per household over ten years, the $130 per year per household will represent less than ½ of 1% of average family income over the period. So even if an all or nothing decision were involved, the impact would be minimal. However, for reasons already cited, the decision is not all or nothing and the need for adequate electricity both at home and on the job means that the ½ of 1% is not an exhorbitant amount to have engaged.

Page 34 - Utility growth decreases profitability. The GAO is repeating the A. J. hypothesis which isn't valid in today's inflationary and regulatory environment. Growth financed at a 12% cost of money cannot be profitable if return on investment is limited to 9.5%.

Page 39 - There is no reason why all states and utilities cannot acquire the needed analytical skills. The acquisition of these skills on a permanent or temporary (consulting) basis is well within the means of any state and all but the smallest utilities. This is not a rationale for federal involvement.

Page 43 - The NRC observation regarding alternatives not eliminating the need for a new plant is an astute one.

When one examines the alternatives, they usually can affect a decision to build in terms of when but not whether.

APPENDIX VII

FEDERAL ENERGY REGULATORY COMMISSION

WASHINGTON 20426

JUN 12 1980

Mr. J. Dexter Peach, Director
Energy and Minerals Division
United States General Accounting Office
Washington, D. C. 20458

Dear Mr. Peach:

As requested by your letter of May 14, 1980, enclosed are FERC staff comments on your draft report titled "Federal Actions Could Help Improve Flectric Power Planning and Decision-Making".

We appreciate the opportunity to provide comments.

Sincerely,

William G. McDonald
Executive Director

Enclosure

Office of Electric Power Regulation

Staff Comments on Draft of General Accounting
Office Report Federal Actions Could Help Improve
Improve Electric Power Planning and Decision-Making

The thesis of the report appears to be that electric ratepayers are experiencing significant costs because of deficiencies in the forecasting methods used by utilities, that State regulatory bodies generally are not equipped to provide effective review of utility forecasts, that most utilities and States do not promote conservation and other alternatives as electricity supply actions, and that Federal initiatives are desirable to ensure use of the best forecasting techniques and the use of utility plans which are consistent with national energy policies. A specific recommendation is that the Adminstrator of ERA develop "a comprehensive electricity program", with input from the FERC, the NRC, the REA and the Federal power marketing agencies.

While improvements in load forecasting are certainly helpful to electric economy, avoidable forecasting errors have not been shown to be a significant cost factor in comparison to other factors. Although the report provides a reasonably balanced discussion of the strengths and weaknesses of various forecasting techniques, it does not provide any data indicating the additional costs which ratepayers are experiencing as a result of avoidable forecast errors, or the economic benefits of the proposed Federal program. As the report recognizes, there is great uncertainty in any forecast, one of the largest of which is the inability to forecast future economic growth, so that there is a high probability that any forecast will be wrong.

A serious shortcoming in the report is its failure to recognize the fact that utilities constantly modify construction program schedules to reflect the load growth actually occurring. As the decline in load growth has become evident over the past five years, utilities have set back the construction of hundreds of units. A 'forecast' or 'plan' has not been the basis for a rigid construction and investment schedule. The problem which should have been addressed is the larger issue of how utility facility construction can be best matched to the demand. Forecasting is only part of the problem, and is probably not as significant as uncertainties in the schedule on which new units can be available.

Two points deserve recognition in regard to utility power planning. First, the diversity in planning between utilities can be helpful. Time after time, the "excess capacity" of a utility has turned out to be not excess at all, because of unanticipated events. With the loss of both units at Three Mile Island (1725 MW), the PJM Pool could have experienced far greater problems had there not been "excess capacity". Second, a distinction should be made between the load growth projection used by a utility as a basis

for construction planning, and a 'forecast'. There is practically no major construction project that is completed on its original schedule, and slippage is probable on even a relaxed schedule. Recognizing this, utility projections of load growth for planning purposes tend to be higher than their best estimates of what the load actually will be. It is far easier to slow down a construction project than to speed it up. With three or four years needed just to obtain construction approvals, the important decision to commit significant funds can be made that much further down the road, in the light of the latest data on growth trends.

Inadequate coordination between states has been a greater problem in optimizing power supply than forecasting errors. Some of the states which have most vigorously espoused planning for lower growth rates may be implicitly depending upon assistance from utilities in other states should their projections be wrong, or should unanticipated contingencies occur. To the degree that "a comprehensive electricity program" developed by the Department of Energy could encourage more effective regional power planning, it could be helpful. However, any suggestion that a Federal power plan be the basis for all new construction would put the responsibility for adequacy of power supply with the Federal government. This is not the concept expressed by the Federal Power Act.

Some detailed comments are as follows:

Page 4, line 10. The sentence should read: "DOE's Federal Energy Regulatory Commission (FERC) licenses non-Federal hydroelectric projects and has jurisdiction over the rates for electricity sold at wholesale in interstate commerce."

Page 40, line 32 and following. In licensing hydroelectric projects, FERC evaluates the need for the power. Data submitted by the utility and by intervenors, which may be extensive, are reviewed in the light of regional trends, State forecasts, staff knowledge of forecasting techniques and other available information. The result is a staff finding as to a "band of reasonableness" for future load growth. To say that staff "relies on the utility's data" is highly misleading.

Conservation is not considered as a supply alternative because utilities have little ability t bring about conservation with predictable results. In fact, Federal law prohibits utilities from financing conservation actions by ratepayers. However, conservation as a result of higher rates is reflected in the demand forecasts.

APPENDIX VII

Load management can provide direct economic benefits to utilities and is being pursued by the industry in various forms. However, experimental programs have not shown clear savings in all cases and the lack of predictably certain results makes it impossible at this time to consider load management as a firm supply option.

GAO note: Page references in the appendixes refer to the final report and do not necessarily agree with page numbers in draft report.

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